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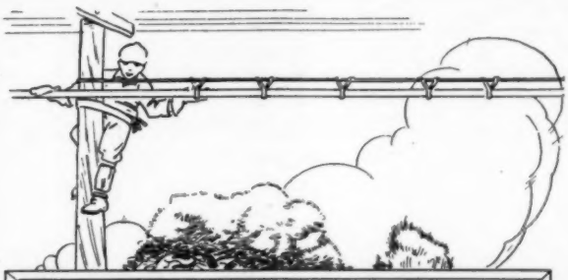

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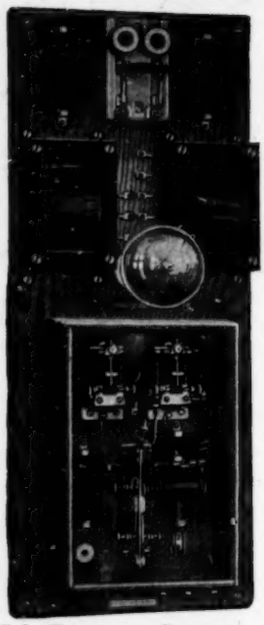
The following is a list of Telephone Exchanges by States that I have appraised:

Arkansas	2	New York	2
Florida	2	North Carolina	6
Illinois	8	Ohio	71
Indiana	219	Pennsylvania	23
Iowa	5	South Carolina	4
Kentucky	21	Tennessee	12
Michigan	20	Virginia	11
Missouri	2		
New Jersey	2	Total	410



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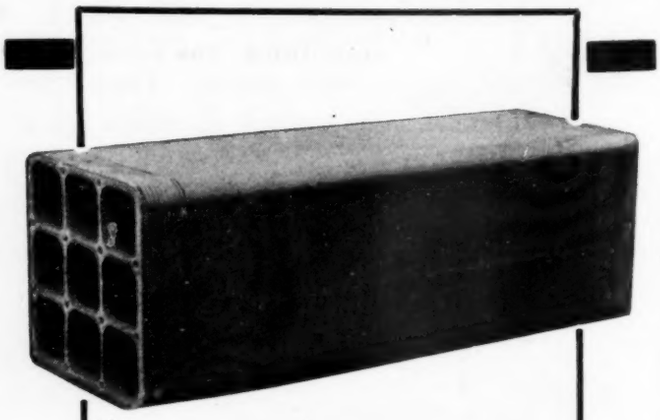

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The Year One of Service Progress

"Telephony's" Annual Review of Telephone Field Shows Period of Great Activity Directed Toward Service Improvement and Betterment—Service Sentiment Strong—Commercial, Traffic and Plant Departments Very Active

By Stanley R. Edwards

Frequently in the past few years the statement has been made that sentiment is passing out of the telephone industry, and that it is becoming a purely commercial proposition. Looking back over the year which is just closing, many indications are observed that tend to show this statement to be true only in part.

The telephone industry is getting down to a practical business basis—but the evidence also shows that sentiment is a powerful influence, and undoubtedly it will increase as time goes on. Again and again at meetings of national, state and district organizations, and also of company organizations, the "spirit of service" is stressed—and around this spirit of service has developed the new type of sentiment in the telephone field.

* * * *

The year 1924 has been a year of constructive activity throughout the entire industry. Manufacturers and operating companies alike have been very active. Reports indicate that the year has been a good one all around.

The operating companies have added to their inside and outside facilities to take care of a considerable increased demand for service, both local exchange and toll. While there has been great activity in installation and construction work, the other departments have likewise been active.

The traffic departments of various companies report improved service and more efficient operating forces. This increased efficiency in the handling of traffic, combined with rate adjustment, has resulted in much improved financial statements.

Due to the publicity of various kinds, which telephone companies and utilities in general have obtained, the position as regards relations with the public is generally very much better.

* * * *

The various telephone associations have continued the good work which has been under way in the last few years and extended it. Companies are realizing more than ever the practical value of membership in the state and national associations, and in states where associations have been comparatively inactive, renewed interest has been created.

Competitive situations throughout the country are gradually being eliminated. In a number of cases where the Bell has had for some years a controlling interest in companies, such interest has been acknowledged and the company taken in as a recognized part of the Bell organization. In other cases, the Bell has given up and withdrawn from the territory, leaving the Independent organization as the operating company and providing it with toll facilities. In some other cases the Bell has taken over the local Independent property.

Adjustments of rates have been in the main secured by the Independent companies without great difficulties. The Bell companies, however, have had several cases in which appeal has been made to the federal courts and in every such case the courts have upheld the company's contentions.

In Indiana the federal court upheld the company and later the commission issued an order after an agreement with the Indiana Bell Telephone Co. in which a new schedule was placed into effect July 1. It was estimated that this schedule would yield the company approximately $422,000 more revenue yearly than the interlocutory rates which were placed in effect in September, 1923, under the federal court's temporary order and which were in effect until July 1 of this year.

* * * *

In New York state after the commission had failed to take action on the company's application for increased rates, following a report of the commission to the state legislature that the rates were insufficient to provide a 7 per cent return, the company appealed to the federal court and in May was allowed a 10 per cent increase in New York City.

The federal statutory court in late July affirmed the decision of the district court

and continued the 10 per cent increase until final determination of the case. A special master is now engaged in investigation of the case. Meanwhile the commission continued the hearings on the company's application and on July 17 denied the application for a temporary increase. It decreed that the rates then current should prevail until its hearings were completed. These hearings are still in progress.

In Massachusetts the New England Bell petitioned for an increase in toll rates and also in P. B. X. rates. After hearings extending over a period of several months had been held, the company withdrew its application and on December 1 applied for a general rate increase throughout the entire state. Hearings on the proposed rates will commence early in the new year.

In Nebraska and in Illinois the Bell companies are operating under rates protected by federal court injunction, final determination not having as yet been made.

In South Carolina the report of the special master to the district court upheld the company's contentions and declared for 8 per cent as a proper rate of return.

In Michigan the state supreme court passed upon the order of the Michigan commission issued in 1922 reducing rates of the Michigan Bell throughout the state. The court refused a writ of mandamus compelling the company to reduce its rates as ordered by the commission.

Hearings have been closed on the applications of the Bell companies in West Virginia and New Jersey for increased rates throughout those states. The hearings extended over a period of several months and were closed during the present month.

In October the Ohio Public Utilities Commission issued an order calling for an investigation of toll and local rates of the Ohio Bell Telephone Co. Conferences have taken place, but no hearings have been held.

In Maryland hearings are under way as the year ends on the application of the Chesapeake & Potomac company for increased rates throughout the state.

In February the Kansas supreme court, after a rehearing and reconsideration, handed down a decision in the case of the Southwestern Bell company vs. the Kansas commission, in which practically the same conclusions were stated as in its former opinion issued on November 10, 1923.

It will be observed that the telephone companies have, upon appeals to the federal courts, been upheld in their contentions as to the rates rendered by the commissions being confiscatory. The federal rates when placed in effect have been accepted by the public generally with but little adverse criticism. Service is apparently the underlying cause of most of the opposition that developed in regard to rates.

In addition to rate cases, some of the commissions have had brought up before them the problem of the small exchange. Several commissions have authorized companies to close exchanges in small communities where local service is to be provided over trunk lines from neighboring exchanges.

In Minnesota, exchange service in one community was entirely withdrawn as no solution could be found. In Alabama, a local exchange was abandoned, but telephone service is obtained with the outside world through a toll station.

The small exchange problem is one to which leaders in the telephone field and state commissions are giving much attention. Just what the final solution of it will be remains for the future, as several paths appear to be open.

Financing Progress.

Closely allied with the rate question is that of financing. The larger companies have comparatively little difficulty in disposing of their securities, but the small companies have not yet been able to secure a wide market for their financing.

The so-called Texas plan is apparently working out satisfactorily under the conditions prevailing in Texas. As yet no other state associations have adopted any plans, although committees have been investigating and studying conditions in an effort to develop a suitable plan of financing for their member companies.

Meanwhile, companies are financing themselves as best they can through local bankers and present owners of their securities.

The telephone companies, generally, have improved their service through the installation of additional equipment, or new equipment in some cases, and a more strict supervision of operating forces and improved methods of training operators.

Probably greater interest was taken in traffic matters during the year than in previous years. State associations which had never held operators' conferences had one or more meetings and those conferences held in states which have had them in other years were more largely attended. This concentration upon traffic and service facilities has undoubtedly resulted in much good.

With improved service and the publicity which telephone companies have obtained in various ways, the public relations of most companies are in excellent condition. The policy of "keeping the public informed" was carried out to an even greater degree in 1924 than in other years.

Telephone executives and frequently operators have repeatedly "taken the platform" at meetings of various church, civic and commercial organizations to tell of their work and the problems involved.

Talks have been made in schools, and pupils have visited the exchanges to have the "art of communication" explained to them. Newspapers have been given accounts of what the companies and their employes are doing. They are kept informed of plant additions, social affairs and the activities of employes in attending conventions, operators' conferences, etc.

Each year the number of companies that are using paid advertising in their local newspapers increases, for those which have tried it find it pays. And this year has seen expansion in both paid and other forms of publicity, with good results in the improvement of public relations.

Association Activities.

The year has witnessed greater interest in the work of national and state associations. The state associations all report increased activity and their annual meetings indicated that member companies approved the work of association officers.

District meetings and operators' conferences were largely attended. Several state associations for the first time conducted operators' conferences and will continue them in the future. Conferences of plant men were also held in several states.

The entire trend of state association work apparently is towards the practical side of the business and associations are arranging to expand and improve their facilities in a service way.

The increased interest in state association work was shown by the organization early this month of the Carolinas Telephone Association by the companies operating in North and South Carolina.

At the annual convention of the Nebraska association a new constitution was adopted and employment of a field secretary authorized. G. H. Presson was engaged for this service and his activities have created much interest in the association.

At the Texas convention plans were made for an advisory staff for the benefit of member companies. The Illinois asso-

COMING CONVENTIONS.

South Dakota, Ward Hotel, Aberdeen, January 14, 15 and 16, 1925.

Minnesota, St. Paul, St. Francis Hotel, January 20, 21 and 22, 1925.

Wisconsin, Madison, Loraine Hotel, February 10, 11 and 12.

Nebraska, Lincoln Hotel, Lincoln, February 17, 18 and 19, 1925.

North Dakota, March 10, 11 and 12.

Ohio, Columbus, New Southern Hotel, March 24, 25 and 26, 1925.

Kansas, Topeka, Hotel Kansan, April 7, 8 and 9, 1925.

Pennsylvania, Harrisburg, Penn Harris Hotel, May 5, 6 and 7, 1925.

New York, Rochester, Powers Hotel, May 13, 14 and 15, 1925.

ciation at its convention announced plans for the employment of a service engineer. These cases indicate ways in which the associations' activities are widening in scope.

Practically every state set new records for attendance at their annual meetings.

Plans for Assisting Smaller Companies.

In the working out of plans for assisting the smaller companies in their financing and other problems, President F. B. MacKinnon of the United States Independent Telephone Association called a conference of the executive and operating staffs of the class A Independent telephone companies in April.

At this meeting traffic, plant and accounting divisions of the association were organized with the purpose in view of making complete studies of these phases of the industry, after which suggestions and aid could be given the smaller companies. The national convention at Chicago in October witnessed the first conferences of these new divisions of the association.

As the work of these divisions takes form, it is expected that many of the problems of the smaller companies can be satisfactorily solved.

During the year there were a number of mergers having in view the cleaning up of competitive conditions. In a number of cases apparent purchases by the Bell were, in reality, the clearing up of situations where the Bell had, previous to existing agreements, acquired controlling interest in the companies.

In Pennsylvania the competitive situation is being cleared up through the Bell withdrawing from certain territory and the Independents in other sections. When all of the mergers are consummated, it is expected that if anything there will be more Independent telephones in the state than before the elimination of competition commenced.

Apparently the Bell company is closely following out the terms of the Hall memorandum.

Improvements and New Developments.

Among improvements and new developments in the art of telephony during 1924 might be mentioned the transmission of photographs by wire which was announced by the American Telephone & Telegraph Co. in May.

In Havana during the latter part of the year the first installation of the Strowger automatic director was placed in service. In Rochester, N. Y., the new system of straightforward trunking between manual exchanges was installed, a description of which was published in TELEPHONY of July 19. The other developments in engineering were toward simplification of equipment and practice.

More and more during the year it has become apparent that radio will supplement and not conflict with wire telephony. Probably the greatest demonstration of this was the program on the evening of Defense Day last September, when General Pershing talked to generals in New York City, Chicago, Omaha and San Francisco over radio and telephone.

On the eve of election President Coolidge was heard by millions of people through a combination of wire telephony and radio. His voice was carried from Washington by wires to 27 broadcasting stations located between New York, N. Y., and Boston, Mass., in the East, and Seattle, Wash., San Francisco and Los Angeles, Calif., in the West.

Regulation of Radio.

While a bill regulating radio has been introduced in Congress, it is not likely that any action will be taken upon it. The third annual Radio Conference in October made a number of suggestions for regulation of radio broadcasting, but only recently Secretary of Commerce Hoover withdrew his approval of the bill.

He stated his belief that the industry is growing so rapidly that no adequate law could be enacted at the present time. He, therefore, felt that regulation should remain in the hands of the commerce department until such time as the industry stabilized and adequate laws could be enacted. He expressed no fears that there would be any monoply of radio obtained through the non-enactment of laws.

In Europe there has been considerable talk of long distance facilities. A permanent commission with headquarters at Paris has been established and it is expected that eventually there will be long distance telephone lines between the various European countries.

In Spain the telephone systems have been turned over by the government to a private company and a rehabilitation of the exchanges and lines is under way.

During the summer a pan-American communications conference was held at Mexico City, at which time conventions were drawn up regarding the method of handling international exchange of messages between South America and North America. This conference was a preliminary to an international conference to be held in Europe.

In Europe and South America the telephone systems are owned and controlled by the various governments. Through international agreements these countries are endeavoring to adopt a set of rules which will govern the method of handling terminating calls.

The delegates of the United States to the conference at Mexico City did not sign the conventions which were adopted, so that when these rules come up for consideration at the international conference in Europe it will be distinctly understood that the United States is not a party to them.

Our government recognizes that the great development in this country of the telephone, telegraph, cable and the radio has been due to private initiative and to private resources, and that we cannot afford to subject our means of communication to the control of foreign governments.

When it is considered how the wire circuits are used in connection with radio broadcasting and that they possibly will be more largely used in the future, it is not difficult to see that the telephone companies of this country have a real interest in international regulations.

Although the year 1924 has established high records in telephone construction activities in practically all parts of the country, the new year promises to be one of even greater expansion in the telephone field. Of the tentative estimates for investment in fixed capital during the coming year available for a number of the larger companies, at least half of them contemplate very material increases in the expenditures for additions to inside and outside plant.

Big Year of Expansion for 1925.

The Rochester Telephone Co., Rochester, N. Y., of which George R. Fuller is president and J. P. Boylan vice-president and general manager, had in service at the close of this year an estimated total of 71,791 stations, an increase of 7,168 over the preceding year. The increase in stations for 1925 is estimated at 6,595.

The net additions to plant this year, excluding purchases, sales or transfers and corrections of records, amounted to $1,471,940. During 1925 it is estimated that the net plant additions will total $1,409,164.

The total operating revenue for 1924 was $3,411,300, an increase of 5 per cent over the preceding year. The expenses totalled $2,556,534, an increase of .5 per cent. The ratio of expense to revenue was 75.2 per cent as compared with 78.6 in 1923. The net income before interest for 1924 was $555,843, an increase of 35.6 per cent.

It is estimated that the operating revenues for 1925 will be $3,711,100, an increase of 8.8 per cent, and operating expenses, $2,744,917, an increase of 6.9 per cent, with a ratio of expense to revenue of 73.9 per cent.

Regarding the operations of the Associated Telephone Co., of Long Beach, Calif., for this year and the anticipations for 1925, Manager Sam R. Heffley writes as follows:

"Our gain in stations for the calendar year of 1924 will be approximately 3,000. There has been a very material improvement in the service, especially at Long Beach, since the automatic was installed in August, 1922.

Our public generally is adapting itself to the use of the automatic and is very much pleased with the service rendered. Our average number of cases of trouble on the automatic system for the past year has been very low, and the greatest num-

ber of cases in any one month which extended over a period of 24 hours was 32, and with over 19,000 connected on the automatic plant at Long Beach this is an exceptionally good record.

To Spend $360,000 Next Year.

"Something over $100,000 has been added to the inside plant during the past year, and over $250,000 to outside plant. We expect to install in the spring automatic in San Bernardino, where we have over 5,000 subscribers. We are next year spending something like $200,000 for central office equipment, and about $60,000 for new building, and approximately $100,000 for outside plant.

When this company was organized in 1920 and on October 1, when taking over the Union Home company there were in service 9,072 stations at Long Beach, and at San Bernardino 3,212 stations. Up to October 31, 1924, Long Beach had gained 10,436 stations, and San Bernardino 1,585, making a grand total in service at the two plants of 24,305 stations.

The company's operating income for the year of 1922 from telephone operative revenues was $485,000; for 1923, $607,000; and estimated for 1924, $700,000, without any rate increase having been administrated during the periods mentioned. The net income has shown even a larger ratio of increase because of the saving through automatic operations.

Our present estimates anticipate a continued growth for the year 1925 as large or larger as that of 1924."

The Dakota Central Telephone Co., Aberdeen, S. D., of which W. G. Bickelhaupt is president and W. R. Johnson, general manager, made some very substantial improvements in both its exchange and toll plants during the year 1924.

Among the larger exchange jobs was the complete rebuilding of the Milbank exchange, which included the construction of a new exchange building and the installation of new common battery central office equipment. The Flandreau exchange was also rebuilt and converted from magneto to common battery.

A new toll board was installed at Tyndall and a number of miles of grounded toll lines were replaced with iron metallic and copper circuits. A number of miles of additional copper circuits were also added where additional facilities were required on account of increasing business.

In conjunction with the Northwestern Bell Telephone Co. a cord circuit repeater was installed at Pierre, making good transmission possible to the Black Hills territory from practically all parts of the country.

The gross expenditures on exchange work, exclusive of routine expenditures, were approximately $125,000 and the expenditures for toll work $90,000, making a total of $215,000.

During 1925 it is estimated that $200,000 will be expended in the toll and exchange plants, exclusive of routine expenditures. Cord circuits and through line repeaters will be installed in Aberdeen and Huron. A 10-position toll board has been ordered for Mitchell and will be ready for service June 1. The installation of this board will require the remodeling of the company's building at Mitchell.

A gain of 1,650 stations was made during 1924. This gain was practically all in towns with a population of 2,000 or more. Revenues, it is reported, have been consistent with station gains. The estimated gain for 1925 is 1,100.

"In general," says President Bickelhaupt, "our program for 1924 was to improve service in bringing up the transmission. This will also be one of our main objectives from 1925."

The Texas Telephone Co., of Waco, expects to have a big construction year in 1925. A gross addition to plant of $564,000 will be made as against a gross of $200,000 for this year. The net increase in the fixed capital account for 1925 is estimated at $437,000, compared with $135,000 this year.

A net station gain of 1,100 is reported for this year and an estimate of 1,500 for 1925. Revenues increased $40,000 this year and an increase of $46,000 is expected for 1925.

The Lima Telephone & Telegraph Co., of Lima, Ohio, reports an increase in gross revenue for the first 10 months of 1924 of $23,457, an increase in the value of inside plant amounting to $71,609 and an increased value of outside plant totalling $129,608.

Approved estimates for construction work for the year 1925 call for a total budget of $240,227. This includes $99,983 to be spent for new buildings, $112,997 for central office equipment, and $27,246 for substation apparatus and installation. A net gain of about 650 subscribers is anticipated for 1925.

Company Keeps Pace with Fast-Growing City.

Lima has been growing by leaps and bounds and the telephone company, says George H. Metheany, secretary and general manager, has grown with and ahead of the city's growth.

"This company," continues Mr. Metheany, "enjoys the respect and confidence of the people of Lima and vicinity to a marked degree and we consider our cordial public relations with the people and the public officials of our community our most valuable asset.

"The spirit of cooperation and consideration shown us has enabled us within the past few months to obtain an increase in rates without an elaborate hearing before the public utility commission, new rates having been arrived at after conference with our city commission, after an informal investigation was had by the engineers of the Public Utility Commission of Ohio.

Our service is conceded to be exceedingly good and is characterized by the people of Lima, Ohio, as the 'best in the world,' and we strive to keep it so."

The excellent service at Lima is undoubtedly due in no small part to the interest taken by the company in the training of its operators and in their comfort and welfare. For some time the local operators have been receiving lessons in elocution under Miss Margaret Fairchild to aid in bringing out the "smile" in their voices. As soon as the local operators have completed their course of instruction and have been awarded diplomas, instructions will be given the long distance operators.

All of the employes of the Lima company are protected by group health, accident and life insurance. Athletic participation and social intercourse between the employes is constantly fostered.

Net Additions for 1925 Estimated at Two and a Half Million.

The Kansas City Telephone Co., of Kansas City, Mo., made a net station gain of 7,500, according to a tentative report of operations during the past year. The increase in revenue is estimated at $342,000. Gross additions to plant amounted to $1,667,000, with net additions, including work in progress, of $641,000.

During 1925 it is expected that the company's operations will show a net station gain of $7,200 and that an increase of $328,000 in revenues will be experienced. Gross additions to plant are estimated at $3,298,000, and net additions at $2,490,000.

The Johnstown Telephone Co., of Johnstown, Pa., of which E. D. Schade is general manager, extended its underground system and installed additional cables this year to relieve congested districts at a capital expenditure of $125,000.

The station gain of about 560 is not a normal one. The company operates in the heart of the bituminous coal region, with iron and steel as its principal industries. These industries have had a bad year and this is reflected in the low station growth report by the Johnstown company.

The Lincoln Telephone & Telegraph Co., of Lincoln, Neb., of which R. E. Mattison is general manager, is completing the year 1924 with a net station gain of about 2,348, an increase of 3.4 per cent over the preceding year, and an increase in revenues of $31,000.

The increase in fixed capital accounts totals $246,000. Of this amount $41,000 was spent on land and buildings; $37,400 on central office equipment; $43,000 on station equipment and $125,000 on exchange lines. In addition $215,000 has been expended on new central office exchange equipment for Lincoln, the installation to be completed in 1925.

It is estimated that the year 1925 will show a gain of 2,030 stations; an increase in exchange revenue of $75,414, and an increase in toll revenue of $37,900. Gross

additions to outside and inside plant for 1925 are estimated at $1,046,795 and net additions, $414,463.

The Home Telephone Co., of Joplin, Mo., made gross additions to plant during 1924 of approximately $380,000, with a net addition to fixed capital of $100,000. During the coming year about $100,000 will be spent in gross plant additions, with a net of $50,000.

The company did not make a station gain this year owing to the consolidation of the duplicate plants at Carthage and the elimination of duplications.

"The year 1924 will close with a net gain of telephones connected on the Erie exchange of 1,410," General Manager John Z. Miller of the Mutual Telephone Co., of Erie, Pa., reports.

"During the year we cut into service another automatic branch at an expense of $68,714, making the fourth on the system. The revenues of the company have increased $70,988; $157,000 has been added to the plant, of which $92,000 was expended for outside construction and $65,000 for inside plant.

The year 1925 will mark an important stride in the history of the Mutual Telephone Co., for in this year we will build a new central exchange and business office on a lot 100 ft. by 165 ft., with an opening of 80 ft. on a side street. The building will cost about $250,000.

Arrangements are being made to move the automatic equipment *en masse* from the old exchange to the new, keeping the equipment in full operation during the move. The company has very good reason to believe that the increase in telephones will be very much greater next year than it has been in the year just past. It is estimated that $280,000 will be spent in extensions to outside and inside plant."

During the year 1924, the Illinois Southern Telephone Co., of Murphysboro, Ill., made a gain of approximately 600 stations. "This was slightly below normal," O. M. Burgess, vice-president and general manager, states, "because of bad conditions in the coal fields. We have construction work in progress amounting to approximately $100,000 and have completed new work amounting to more than $80,000. This consists of new outside plants at Harrisburg, Carbondale and Murphysboro, a new standard 25-ft. toll line between Carbondale and Anna, carrying two copper metallic circuits, and the rebuilding of a number of other toll lines.

"We have considerable new construction work planned for 1925, the estimates for which amount to about $160,000. This includes the rebuilding of the outside plant at Marion, the installation of new central office equipment at Harrisburg and extensions and additions to plant at DuQuoin, Metropolis, Carterville and Chester.

We also expect to make extensions to our toll system and have appropriated approximately $40,000 for this purpose."

The Union Telephone Co., of Owosso, Mich., General Manager W. J. Melchers reports, has done considerable construction work this year, having installed about 41,000 feet of additional cable, both underground and aerial and having strung about 230 circuit miles of copper long distance lines. Part of these copper long distance lines replaced iron long distance lines.

"During the early part of our construction," says Mr. Melchers, "we built a number of pole lines we have since determined would be better consolidated with others and between the consolidating and rebuilding we have cleaned up about 100 miles of pole lines, or long distance lines. For the year 1925 we expect to change the equipment in several of our offices and expect to continue to carry on the program of building additional long distance lines as well as replacing iron lines."

The station increase of the Union company of Owosso for 1924 will be between 800 and 900 stations. The increase in revenue will be approximately $55,000 for the year.

During 1924 the gross revenue of the Glen Telephone Co., of Johnstown, N. Y., increased 11 per cent, due in part to rate increases which became effective in January and February, 1924. The net revenue for interest, dividends, and surplus was equivalent to 7¼ per cent of the value of the property in the public service.

Industrial inactivity prevailed in the territory of the Glen company, according to General Manager G. G. W. Green. This accounts for a small gain in stations. The net gain in stations for the year was somewhat over 100 as against a corresponding gain in 1923 of 735. The total stations in service December 1, 1924, were 11,679.

The value of outside plant added was $96,796; plant retired, $27,955, a net plant gain of $68,841. The value of inside plant added was $45,930, that retired, $32,627, a net gain of $13,303. The net additions to outside and inside plant, therefore, totaled $82,144.

These figures include an estimate for November and December based on the showing of the first 10 months of the year.

The notable increase in facilities and service was the construction, near to completion, of an exchange building in Gloversville, N. Y. This building is of brick, 50 ft. wide by 60 ft. deep, two stories in height. There is to be installed in the new building during the first part of 1925 a 15-position Stromberg-Carlson super-service feature switchboard.

On account of the low price of copper the program of displacing all iron toll circuits with copper was advanced and sufficient copper wire was purchased, to be delivered in 1925, to place copper on all toll circuits during the coming year.

It is apparent from the figures gleaned from the books of the Tri-State Telephone & Telegraph Co., St. Paul, Minn., that the year 1924 has proved one of the most successful, from practically every standpoint, in the history of that company.

Business conditions throughout the territory served by the Tri-State company,

LEAKS

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

As I sit here tonight in my room at a busy little hotel, the rain splashing on the window sounds good to me because the splashing is not caused by a leak as *is* the case of the water drip-dripping from the hot water faucet into the bath tub.

Tonight marks the end of the second week I have spent at this hotel, and I am wondering how it would be here if that incessant dripping should cease; how many gallons of water have uselessly run away; what the water cost is; and whether some indifferent employe has failed to report the leaking faucet. I mentioned it to the clerk a couple of times.

Waste, waste, waste! Wherever I go, I see evidence of waste. Not waste in big things, but the drip-dripping little wastes.

In telephone offices I see waste in pencils, broken curtains, crumpled long distance tickets on the floor about the operator's chair, ragged cords, broken keys and lamp caps. At hotels it is broken stitches in bedding and leaky faucets. In the dining rooms, broken food of no use to anyone—and think of the hungry!

Folks, let us put this down in our list of New Year Resolutions: *Avoid The Dripping Wastes.*

officials point out, which includes the city of St. Paul and a score of smaller cities and towns located largely in southern Minnesota, were not particularly encouraging during the final months of 1923 and the first few months of 1924. Nevertheless the Tri-State company, confident of a steady and certain improvement, made adequate plans for additions to both inside and outside plant and in this their judgment has been fully justified.

Constant improvement and additions were made, including particularly the construction of new toll lines, specifically in that territory south of Mankato where facilities were insufficient to handle profitably and satisfactorily a constantly increasing amount of long distance traffic. No new exchanges were constructed during the year although the station gain for the system, actual for the first 10 months and estimated for November and December, totaled 3,162. During practically the same period in 1923 the company realized a net station gain of about 2,000.

Tri-State of St. Paul Made Excellent Progress.

For the year 1925 the company finds many reasons for predicting a much greater net growth, placing the station increase for the year at 4,411 plus an additional increase by purchase of 5,477 or a grand total of 9,888.

Of the 1924 estimate made for additions to plant, $442,510.93 has been expended on outside construction during the first 10 months and $209,413.22 on inside plant, a total for the two items of $651,924.15. At this time construction work in progress involves a further investment of $66,415.24 on inside and $230,260.31 on outside construction or a total of $296,675.55. With the advent of winter weather some of this work may be delayed necessitating the carrying over of the portion uncompleted into 1925.

For the year the increase in operating revenues over 1923 was $199,700. The revenue gain during 1925 has been estimated at $349,000, subdivided $271,020 for exchanges, $69,100 toll and $8,880 miscellaneous.

The Tri-State budget for 1925 contemplates a total expenditure approximating $1,682,492, as compared with $948,599 this year. Of this amount inside plant will require, according to estimates, $640,580; outside plant, $542,108; toll lines, $245,643; land and buildings, $191,161.

A new garage and warehouse building will be constructed in St. Paul at an estimated cost of $150,000.

The year just closing has been an exceedingly busy one for the Home Telephone & Telegraph Co., of Fort Wayne, Ind., and although the station gain for 1924 is the largest in the company's history, an even larger gain is anticipated next year, according to Frank E. Bohn, vice-president and general manager of the company.

In outlining the work of this year and the program for 1925, Mr. Bohn writes:

"During 1924 we started construction on our new Main exchange building, which will be completed early in 1925 and cost approximately $300,000. We also started construction on our new South exchange building, which will be completed very early in 1925 and cost approximately $65,000. The Main exchange building will house the general offices of the company and the new automatic equipment for the Main exchange area. The South exchange building will house equipment only, of the automatic type.

We also completed our underground construction program, which was started in July, 1922, and called for 20 miles of underground trench at a cost of $222,093. We also completed a complete rehabilitation of the entire outside plant at a cost of $100,000. In the latter part of this year we started installation of the automatic equipment in both the new exchange buildings. This will be completed about the middle of 1925. We added, in 1924, to our outside plant approximately $557,000 in capital additions and $283,000 to inside plant.

Our stations increased 2,552 in 1924. This is the largest year in the history of the company. Our operators answered 67,000,000 calls, or an increase of 10,500,000 over the previous year.

Our program for 1925 covers the cutover to full automatic equipment of the Strowger type some time before the middle of the year. As Fort Wayne is growing very rapidly, we expect a larger gain in stations in 1925 than in 1924 and our plant will be prepared, after the cutover, to take care of any such growth. At the time of the cutover we will have a property in Fort Wayne worth approximately $4,000,000, based on the valuation of the public service commission, plus the cost of the additions after that date.

Most of the work during 1925 will be incident to the cutover and very little work in the way of extensions to the outside plant will be done, because practically all of the rebuilding and extensions to the outside plant were completed in 1924. However, we shall add about $1,250,000 to our inside plant at the time of the cutover.

Fort Wayne Home Fully Financed.

In 1924, we completed our financing for our program of expansion; $1,100,000 of our 7 per cent preferred stock was sold to our subscribers in Fort Wayne; $400,000 of this stock was sold to others within the state of Indiana but outside of Fort Wayne. We also sold $500,000 of 6 per cent, Series A, gold bonds. The proceeds from the sale of both of these issues were used to finance our program of expansion."

The American Telephone & Telegraph Co. will expend in 1925 for additions and improvements to plant $265,000,000, according to advance reports. This figure is only equaled by the budgetary expenditures made by the company in the current year and which constituted a new high record for the company.

The 1924 budget, of the same size, was an increase of $16,000,000 over the construction expenditures of the company in 1923, and for the five years to the end of 1924 it will have disbursed for this purpose more than a billion dollars.

Growth of Bell System.

Until recently the United States Steel Corp. was the largest of the country's industrial corporations in point of capital stock outstanding and in number of shareholders. Today, with stockholders numbering more than 350,000 and capital stock outstanding of more than $881,000,000, the A. T. & T. ranks first and is second to United States Steel only in assets.

Bell-owned net plant additions by the A. T. & T. from 1904 up the current year cost $1,693,690,000. Including expenditures of $265,000,000 this year and $265,000,000 for next year, the total for the 22 years will have passed $2,223,000,000. The company's construction progress is more strikingly illustrated by the fact that in 1919, the first calendar year following the war, the construction outlay was only $73,000,000, while in 1920 it was $148,000,000; in 1921, $180,000,000; in 1922, $185,000,000; and in 1923 over $249,000,000. In 1914 it was $50,000,000, and in 1904, $33,000,000.

In 1913 values the company's budget for either 1924 or 1923 would represent expenditures of approximately $175,000,000.

By the end of 1924 a total of 750,000 new telephones will have been added to the Bell system, and the forecasts of future development indicate that this station growth should continue in 1925. It is said to be even probable that the growth in 1924 will be surpassed in 1925, which would mean an increase in the budgetary estimate compiled by the company already for 1925.

The net additions this year include $42,000,000 for land and buildings, $86,000,000 for switchboards and central office equipment, $100,000,000 for outside plant in the form of poles, wires, cables and conduit, and $35,000,000 for subscribers' station equipment.

These "nutshell" reports from many of the class A Independent companies and the Bell system indicate the great activity in the operating field during the year. And such activity has also been reflected in the business done by the manufacturers of telephone equipment and supplies.

Based upon the plans announced by the larger companies of their expenditures for 1925, it is reasonably certain that the new year will see great activity among the smaller companies as well.

In all of these activities good management is essential. That is, a problem of the industry that is slowly being solved in the smaller companies, backed up by the sentiment of service cherished by employes.

The Electrics of the Vacuum Tube

Second of a Series of Articles Discussing the Action and Characteristics of Two and Three-Electrode Vacuum Tubes; Their Use as Amplifiers and Detectors—The Three-Electrode Tube; Its Use as Amplifier and Detector

By John M. Heath,
1st Lieutenant, Signal Corps Corps, United States Army.

and

O. M. Hovgaard,
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The three-electrode vacuum tube differs mainly in its appearance from the two-electrode tube in that a third element has been inserted between the filament and the plate. This third element, or electrode, is usally called the grid and, as its name suggests, takes the form of a metal plate perforated with holes, or may be made of fine wire mesh.

The grid is usually made of copper or nickel and its chief function in the tube is to control the electron flow from the filament to the plate. Its action in so doing is as follows:

If we place a negative charge on the grid, it will tend to repel many of the electrons emitted by the filament and will thus have the effect of a negative space charge in its limiting the electron flow. As the potential of the grid is made more negative, a point is ultimately reached where it will prevent all flow of electrons from the filament to the plate.

The grid voltage necessary to reach this point will be lower than the corresponding plate voltage and their ratio will depend on their relative distance from the filament. The ratio of grid voltage to plate voltage necessary to obtain this point may run as low as one-tenth in receiving tubes and as low as one three-hundredth in large transmitting tubes.

If now we adjust the potential so the grid will be positively charged, it will be found that the plate current will be somewhat increased on account of the grid having added its attractive force to that of the plate. All of the electrons thus attracted will not, however, flow to the plate as the grid itself is now positive with respect to the filament and will, therefore, absorb some of them itself, thus creating a grid current.

The plate saturation current obtained in this manner will not be the true saturation current, for we shall have to add the grid current to the plate current to obtain the true value. We see that by simply varying the grid potential we can vary the plate current from zero to saturation.

Under normal conditions there is usually a space charge of negative sign formed by the cloud of electrons on their way to the plate, the effect of which is mostly felt in the neighborhood of the filament where the electrons have their smallest velocity.

The newly-emitted electrons, if they are to reach the plate, have to overcome the repulsion of the whole mass of electrons between the filament and plate. Many electrons fail to overcome this repulsion and return again to the filament, unless the plate potential is high enough to overcome the space charge.

If the grid is connected to the negative

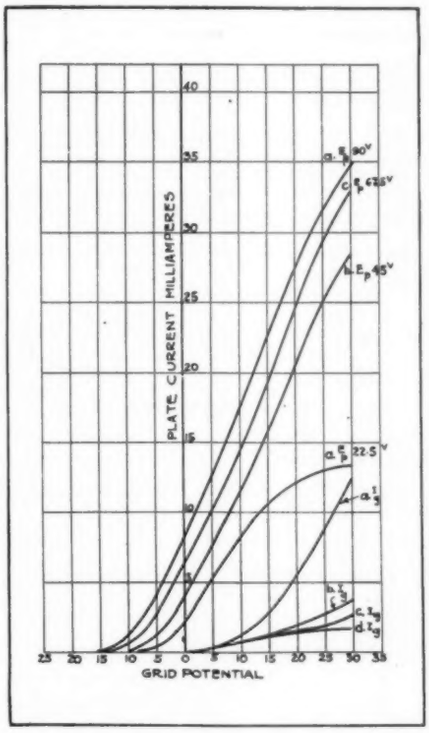

Fig. 5. Characteristic Curves of a Three-Element Vacuum Tube.

side of the filament, it may be considered as having zero potential. It will, however, be at a lower potential than the positive side of the filament and will, therefore, tend to repel electrons which come from that end. There will thus be formed a small space charge due to this effect which will cause the plate current to be smaller than if the grid did not exist.

If we place a negative charge on the grid, the latter will repel electrons which would normally have gone to the plate. These repelled electrons will collect in the space between the filament and the grid and constitute a strong space charge which combines itself with that of the grid to try and prevent electrons passing to the plate.

The reduction of the plate current consequent on placing of a negative charge on the grid is, therefore, the result not only of the repulsion of the grid, but also the repulsion exercised by the additional space charge produced by the negative grid potential; hence another and very important explanation of the sensitiveness of control possessed by the grid.

When a positive charge is placed on the grid its electrostatic effect on electrons in the neighborhood of the filament is very considerable and it tends to neutralize the electrostatic effect of the space charge. The result is a sudden increase in the plate current. It is of value to note that the space charge is now moved into the region of the grid plate.

The question of the proportions of the grid is important. The attractive force of the plate on an electron near the filament will depend largely on the spacing of the wires which constitute the grid. If the wires are very close together, the grid will almost completely screen the electron from the electrostatic field of the plate, so high plate potentials will be necessary. The modern practice is towards rather open grids and the use of low plate potentials.

By reference to Fig. 5, which gives a family of characteristic curves of a three-element vacuum tube, it will be seen that by taking any of the curves and suitably adjusting the grid voltage, we can use the tube at any point of its curve.

If we take the slope of the curve for any point, we shall obtain the ratio of effectiveness of plate potential to grid potential. This ratio is called the amplification constant of the tube and is designated by the letter u. The amplification constant will be seen to vary depending on the part of the characteristic curve in use.

What really has happened in Fig. 5 is that the curve has been displaced to the left as the plate voltage was increased. The reverse effect may be obtained by increasing the filament emission as indicated in Fig. 6. Here the effect is that of shifting the curve to the right.

Amplification by the Three Electrode Vacuum Tube.

When we consider the three-electrode tube from the standpoint of an amplifier, it acts much as did the two element tube in this respect. The diagram in Fig. 7 indicates how this action is obtained, the

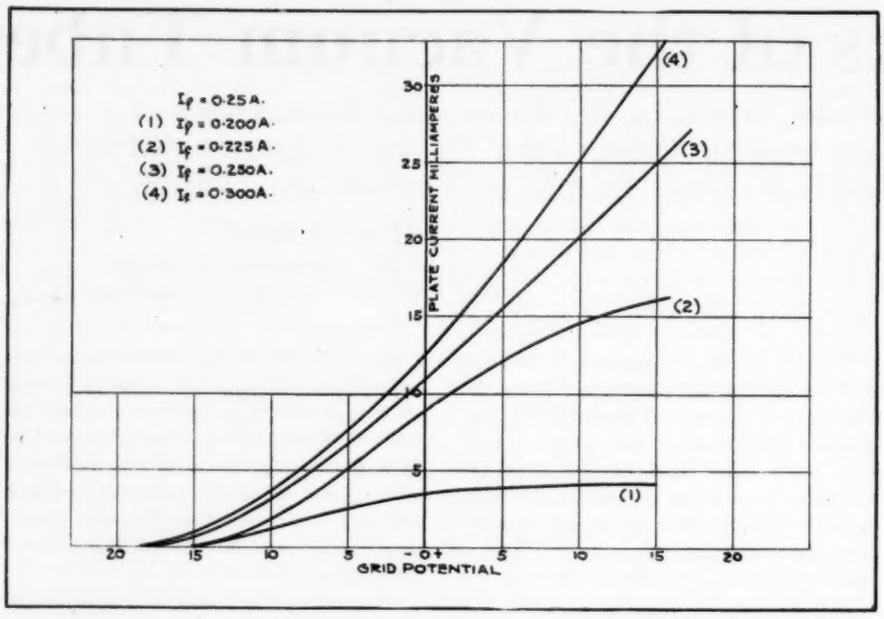

Fig. 6. Effect on Characteristic Curve of Increasing the Filament Emission.

explanation of the action being the same as that of rectification with the two-element tube.

It will be seen that as long as the output of the tube lies within the straight portions of the characteristic curve, distortionless amplification may be obtained. If, however, the variation of grid potential becomes so great that we go beyond the straight portion, no increase in signal strength will be found; and if the signal is in the nature of speech, there will be serious distortion of the input.

For strong signals it is, therefore, desirable to extend the curve vertically and this, we have seen, may be done by increasing the filament current and the high-tension battery voltage. We still, of course, keep the whole of the straight portion of the curve to the left of the grid zero ordinate.

For the valve to be an efficient amplifier, the straight portion of the characteristic curve should be as steep as possible. This will, of course, give a large value for μ. Furthermore, all the portions of the straight portion of the curve used should have about the same slope or there will be distortion.

Before passing on to the discussion of the various functions of the three-electrode tube it would be well to point out that the results here dealt with in graphical form have been obtained by giving the grid a steady, maintained series of potentials. These may, therefore, be termed the static characteristics of the tube. Those characteristics which deal with the tube under conditions of varying grid potentials are called the dynamic or *AC* characteristics of a tube.

The Three-Electrode Vacuum Tube as a Detector.

The three-electrode vacuum tube may be used as a detector of electromagnetic waves by taking advantage of the following effects:

(a) The non-linear characteristics of the grid-potential plate-current curve.

(b) The establishment of grid currents.

(c) Combined effect of *(a)* and *(b)*.

(d) The cumulative rectification action of the grid condenser.

We shall take up each of these effects in turn. Referring to Fig. 8, and bearing in mind the explanation of rectification due to non-linear characteristics as given in connection with Fig. 2, it will be seen that the strength of the rectified signal will vary somewhat as given by the lower curve *ABCD*.

It will be noticed that the loudest signal is obtained in the neighborhood of the initial saturation point of the curve, and the explanation of this is found in the steepness of the curve at this point. Another feature of the curve *ABCD* is that after passing the point *D* there is a distinct drop in signal strength, due to the grid now being positive—at least during the positive half of the impressed oscillations—and as a result a grid current has been established.

This grid current represents loss of available electrons, so far as the plate is concerned, and there is, therefore, less variation of the plate current and, consequently, a weaker signal in the telephones.

We have just seen that when the grid becomes positive, the anode or plate current commences to drop off after it has reached a saturation point. Usually this

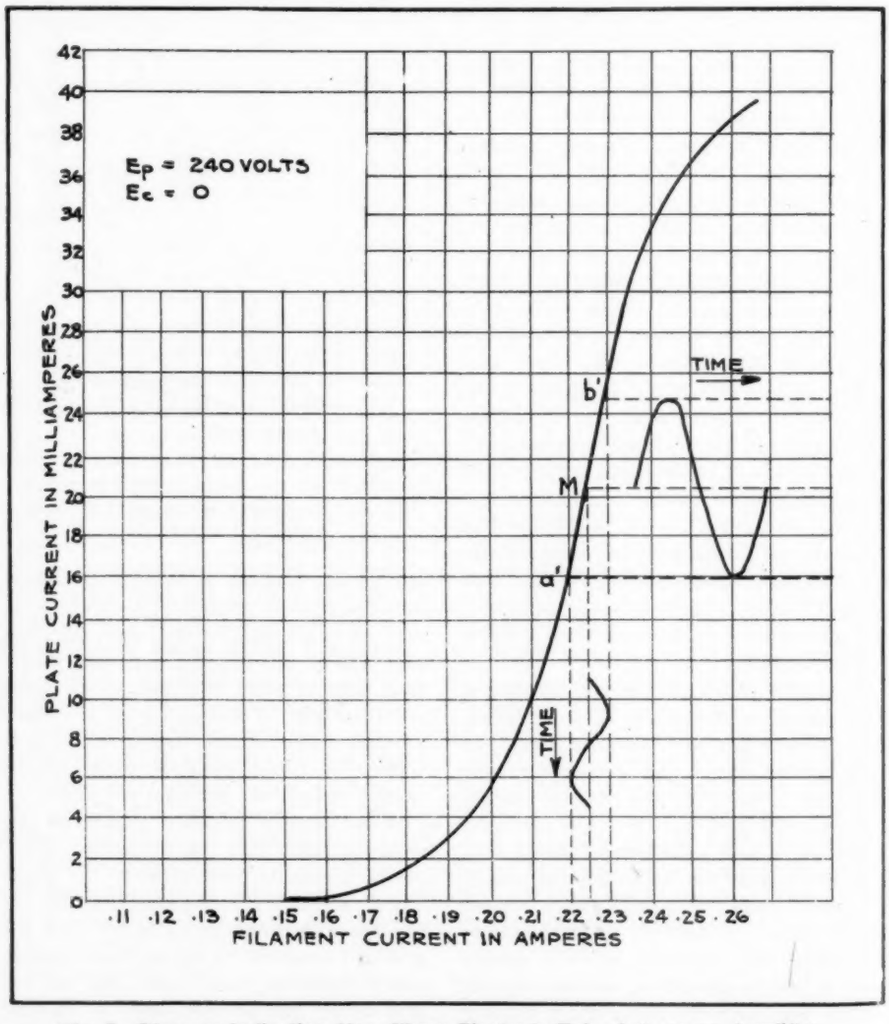

Fig. 7. Diagram Indicating How Three-Electrode Tube Acts as an Amplifier.

curve would proceed upwards, but after a certain point has been reached it will be found that further increase in the positive potential of the grid will bring the plate current curve down and cause the grid current curve to continue rising.

The comparative curves for grid and plate currents, under such circumstances, are given in Fig. 9. It will be seen that at a definite but not very critical grid voltage, either an increase or a decrease in grid potential will cause a decrease in the plate current. This effect may, of course, be utilized to obtain rectification by average decrease in plate current.

The plate current curve, however, is not very sharp at this point and it would. therefore, take a very powerful impressed signal to give satisfactory response in the telephones.

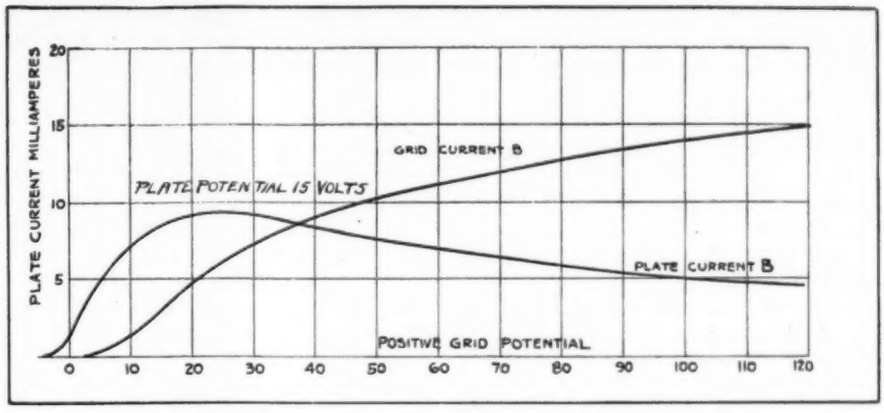

Fig. 9. Comparative Curves for Grid and Plate Currents.

Rectification by Grid Currents.

In the discussion of rectification by a symmetry of plate current curve it will be noticed from the curve in Fig. 8 that practically the whole curve was found to the left of the zero grid voltage ordinate. We will now imagine that the zero grid ordinate has been moved to a position indicated by the dotted line, *XY*. The lower, or signal strength curve, of course, no longer applies. The small dotted curve *YZ* represents grid current to the same scale as the plate current.

The operating point which we will consider will be *B* on the grid zero ordinate. When electromagnetic waves are impressed on the grid the latter will have its potential varied alternately above and below its normal value.

If this normal value is negative, the variations will be equal. When, however, the grid is at zero potential, only negative half-cycles produce their full effect. The positive half-cycles will tend to give the grid a positive charge which will tend to attract electrons. These electrons will partially neutralize the charge which the positive half-cycle is trying to build up, thus giving a damping effect to the positive half of the oscillations.

When the grid becomes negative, the grid-to-filament resistance is practically infinite and there will, therefore, be no current flow in the grid filament circuit. When, however, the grid becomes positive, there will be established a grid current which tends to lessen the grid filament circuit resistance and there will be a damping effect during this time.

The natural effect of the grid, when operated in this manner, will then be to cause an unequal variation of the grid potential, about its normal value. This will, of course, cause an asymmetrical variation of the plate current even though we are using a straight portion of the plate current characteristic curve.

Comparing our two cases of rectification, we see that whereas in the previous case the variations of grid potential were symmetrical but the curve was not linear; now the curve is linear but the variations of the grid potential are not symmetrical.

That there really is an average decrease in the normal potential of the grid may easily be proved by inserting a pair of telephones in the grid circuit when signals will be heard. The strength of signals when using this method of rectification will depend largely on the steepness of the slope of the plate current curve and the steepness of the slope of the grid current curve.

Grid Characteristic Curves.

The grid current curve and its analyses is of great importance in dealing with the action of the tube as a detector. The amount of grid current will depend largely on the potential of the grid, its structural dimension, the potential of the plate and the value of the filament current. Naturally the greater the positive potential of the grid, the greater will be the grid current.

In the case of a hard tube, the grid cur-

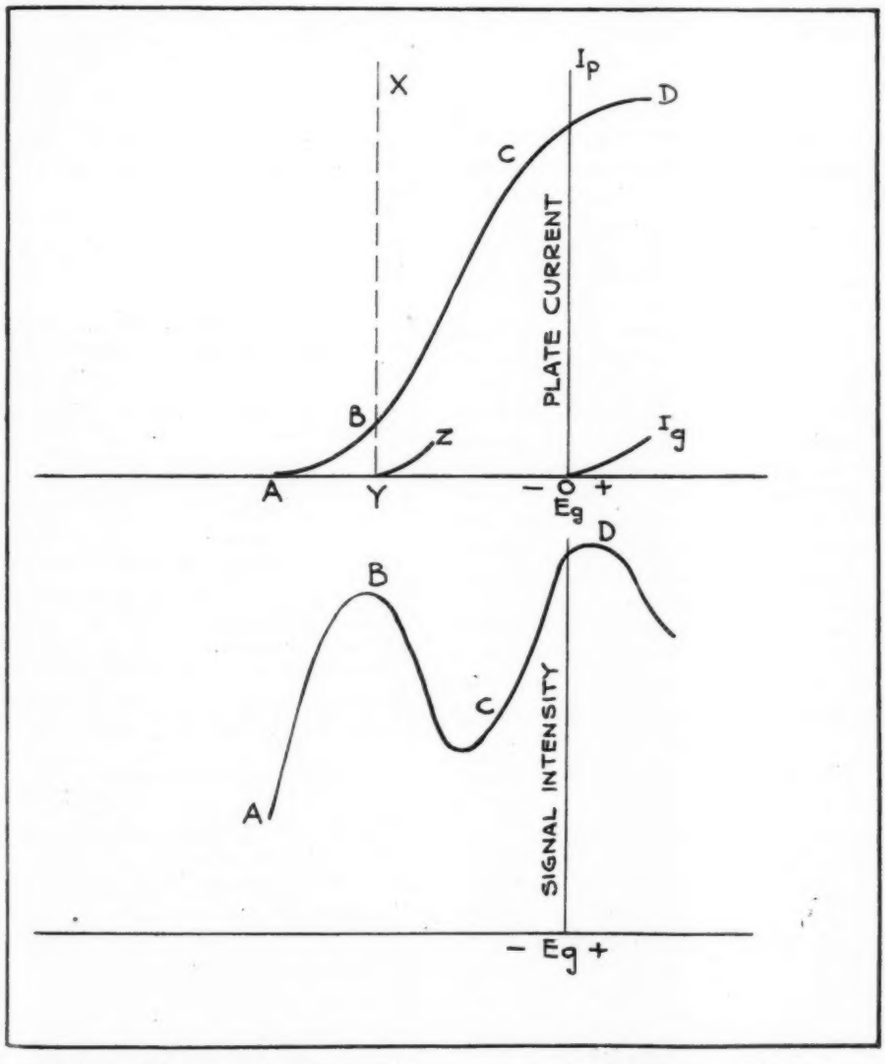

Fig. 3. Diagram Showing Action of the Thr ee Electrode as a Detector.

rent curve usually starts a little to the left of the grid zero ordinate. This may be explained as follows: The grid is supposed to be connected to the negative end of the filament and will, therefore, assume the potential of the negative end of the filament with respect to the rest of the filament. Accordingly, as long as no foreign potentials are impressed on the grid, it should attract no electrons from the general flow to the plate.

It is, however, inevitable that some of the electrons collide with the grid, and at zero grid potential there will, therefore, be a grid current.

The effect will thus be to shift the point of zero grid current to the left of the grid-potential zero ordinate.

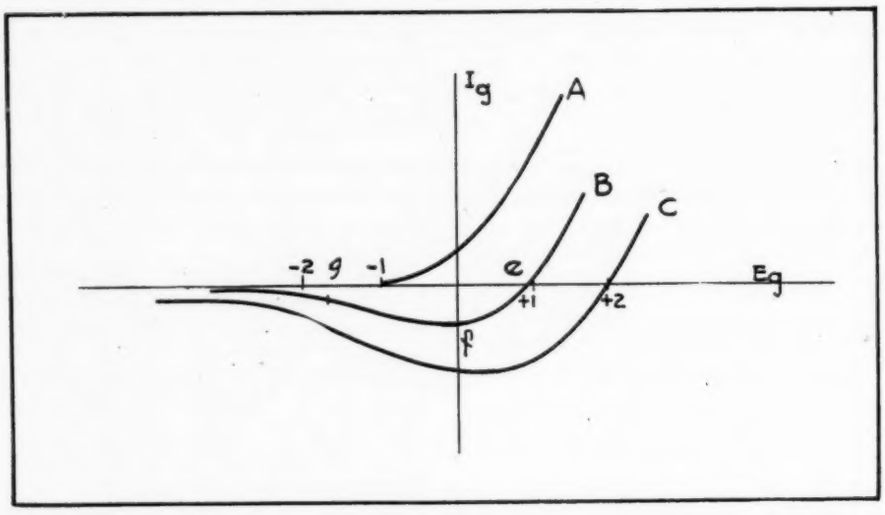

Fig. 10. Grid Current Curves as Affected by Increases in Plate Potential or Filament Emission.

Referring to curve *A*, Fig. 10, it will be seen that practically any adjustment of grid potential from +1 volt to —1 volt will cause an increase in the grid current for the positive half-cycle to exceed the decrease for the negative half-cycle. The average effect will then be to cause an increase in the normal grid current.

From the foregoing analysis of the causes of the grid current it will be seen that the grid current curve will be moved to the right by an increase in plate potential, and to the left by an increase in filament emission.

Effect of Positive Ions on the Grid Characteristic.

The grid current curves so far treated have been these of hard vacuum tubes. If, however, the tubes contain some trace of gas, the electrons in their travel to the anode will collide with its molecules and disintegrate them into electrons and positive ions. The electrons will, of course, join the general stream and travel towards the plate, but the ions, being positive, will start towards the filament.

Before reaching the filament they encounter the negatively charged grid which assimilates them, causing a positive grid current. This positive grid current we lay off below the grid potential axle to distinguish it from the normal grid current and we then obtain a grid current curve as given by curve *B*, Fig. 10.

It will be seen that there are two distinct points on this curve where the grid current is zero, and one point where the plate current is zero.

The point *e* represents conditions existing where the grid current, due to ionization, just equals that due to attraction of electrons. The point *f* is called the saturation point or ionic saturation point, where the grid has absorbed all the positive ions available. The point *g* is the stage where the grid has absorbed all it can and no electrons or ions are attracted to the grid. An increase in the filament emission will tend to lower the whole curve as shown in curve *C*.

Since, by increasing the filament emission, we can shift the curve to the left, and by increasing the anode potential we can raise the curve vertically, it will easily be possible to adjust the grid current curve so that the best operating point is used.

The fact that an ionized tube will have a portion of its grid curve below the zero current makes it possible to use this as a measure of the hardness of a tube. The lower the grid current curve goes below the zero axis, the softer is the tube.

(To be concluded.)

Bell Company Forms Concern for Research Work.

The American Telephone & Telegraph Co. announced on December 17, after a meeting of the board of directors, that the Bell Telephone Laboratories, Inc., was being organized to take over the laboratory and research work heretofore carried on by its affiliated company, the Western Electric Co. The formation of the new company was said to mean a greater concentration upon the experimental phases of the telephone industry.

In accordance with the plans for the new concern, F. B. Jewett, who has been vice-president of the Western Electric Co., was elected vice-president of the American Telephone & Telegraph Co. as "a part of a program for further coordination of the research and development activities which have been constantly expanding." Vice-President John J. Carty was made chairman of an advisory board on research and development policies and also chairman of the board of directors of the Bell Telephone Laboratories, Inc., the new company.

The new company will be jointly owned by the American Telephone & Telegraph Co. and the Western Electric Co. Mr. Jewett will be in direct charge of the research and development department of the American Telephone & Telegraph Co. and president of the new Laboratories company.

Mr. Jewett is well known in the scientific world, being a member of the National Academy of Sciences and the National Research Council and a past president of the American Institute of Electrical Engineers.

Illinois Bell Company Suffers Million Dollar Storm Damage.

The Illinois Bell Telephone Co. listed property damage of more than $1,000,000 as a result of the storm of last week. More than 21,000 poles were blown down, and hundreds of miles of wires ripped out. South of Peoria mile after mile of poles and wires collapsed and service was practically nil.

In most Illinois cities local service was maintained, chief sufferers being toll and long distance lines.

Report of Tri-State of St. Paul for Nine Months of 1924.

The Tri-State Telephone & Telegraph Co. early this month issued the following condensed income statement for the nine months ended September 30, 1924:

Gross earnings from all sources		$3,718,414
Maintenance, traffic, commercial, general and other expenses	$1,912,980	
Federal, state and municipal taxes	249,992	
Reserved for depreciation of plant and equipment	629,538	2,792,510
Net earnings, prior to interest		$ 925,903
Interest paid and accrued		212,920
Net earnings, after interest charges		$ 712,983

The operating revenues show an increase of 4.25 per cent, while the net earnings, after interest charges, show an increase of 5.43 per cent.

"Both local exchange and toll business," President G. W. Robinson reports, "have shown a marked improvement over the first half of the year, and all indications point to an early return to normal conditions in this section."

Progress Made in Radio Engineering

Survey Reveals That Current Progress Is Characterized by Actual Engineering Development—Outline of Advances—Increase of Knowledge and Practical Applications — Summary of Addresses at Section Meetings of A. I. E. E.

By Dr. J. H. Dellinger,

Chief of Radio Laboratory, United States Bureau of Standards

A survey of progress in radio reveals that this is the era of radio engineering. This statement does not refer to the importance or extent of radio engineering but to the type of development now going on in radio as compared with that of past years.

Relatively speaking, radio has been crude heretofore, whereas the progress now being made is not merely empirical but is more largely characterized by actual engineering development. We now have not so much the invention of devices as the perfection of them. This statement is very general.

There have, of course, been triumphs of engineering in the past history of radio, and on the other hand the process of "cut and try" will continue to be used in the future. Nevertheless, broadly speaking, radio engineering has now taken definite form and is the tool by which further progress in radio will be wrought.

While a number of outstanding recent developments arrest the attention, it is also true that very substantial progress is being made all along the line of radio engineering. Thus, in the development of new and improved radio communication methods or systems, we have marked extension of the available frequency range, great improvements in directive radio transmission, advances in the perfection of selective radio systems, and engineering development of line-radio or carrier-current communication.

Among radio devices and applications of radio, there is outstanding progress on radio beacons, on the uses of radio for air-craft navigation, on direction finders, and on radio vision. In the field of research and study of the problems of radio we have important progress now going on in radio measurements, in standardization of apparatus, in the study and mitigation of the vagaries of wave propagation and atmospheric disturbances, and in the wide reaches of the interference problem.

The most conspicuous recent development in radio engineering is the conquest of the new domain of ultra-radio or very high frequencies (short waves). Even the existence of the vast range of frequencies above 2,000 kilocycles (below 150 meters) was hardly suspected, and certainly was generally forgotten up until less than a year ago. One curious reason for the subordination of this range of frequencies has been the erroneous use of wave length in meters as an expression of radio frequencies. Radio engineering actually deals with currents which have a certain frequency. The wave length of the wave as it travels along in space can be calculated from the frequency, but it is a derived and an artificial concept.

Frequencies up to 20,000 kilocycles have come into extensive use. Actual radio services are being conducted in this region by broadcasters, transoceanic communication companies, military services, amateurs; in short, every important radio interest has begun operations between 2,000 and 20,000 kilocycles.

Even higher frequencies have been used in experiments, but there is every likelihood that in the development of frequencies above 20,000 kilocycles directive transmission will predominate and the problems will be of a distinctly different character.

So important are these high frequencies now, the Third National Radio Conference held in October, 1924, parcelled out the high-frequency territory among the various radio services, thus reaching a solution of a problem which only a year ago was regarded as insoluble, that of finding more communication channels.

Alternate frequency bands approximately 10 per cent wide were assigned to the following different services: Land point-to-point, aircraft, ship, relay broadcasting, public service, amateur and army mobile. An important principle was followed in this assignment, viz., each service was protected from possible harmonic interference from stations of other services by placing the several frequency bands of any given service on its own harmonics.

Great improvements are in progress in directive or "beam" transmission. It is accomplished by using a number of transmitting antennas and so adjusting the phases of the current in each, in relation to their distances apart, that re-enforcement of radiation is obtained in one direction and more or less neutralization of radiation in other directions.

An obvious advantage of beam transmission is that much lower power is required than in ordinary radio transmission, since the transmitting power is all utilized in sending the waves in the desired direction instead of all directions. This important advantage, which means reduced cost, will probably not be fully realized because the great radio transmission in the desired to undesired directions is probably reduced as the wave spreads out to great distances.

The undoubtedly great directivity for relatively short distances from the transmitting station, however, offers highly important advantages in another particular, the reduction of interference caused by the transmitting station.

One of the principal means of overcoming interference between the transmissions from simultaneously operating radio stations is obviously the increase of selectivity or narrowing of the band of frequency which each station uses. Progress in this direction is being made in all the various types of transmission, as for example, through the use of filtering devices for radio telephony and coupled circuits in spark apparatus. The principal advance, however, is the increasing adoption of continuous-wave transmission for radio telegraphy.

We also have the advent of strictly constant-frequency systems. A striking means of accomplishing this is furnished by the piezo-electric oscillator. A new radio communication system of the utmost selectivity and precision is made available by this new device, and services which require the operation of a large number of transmitting stations spaced as closely together as possible in frequency and taking full advantage of carrier wave transmission will find this a great improvement.

The various causes of interference divide into two great classes, natural and man-made. Progress is being steadily made against both of these enemies. As to the natural interference, there will always be a certain residuum of atmospheric disturbances and fading which will necessarily limit the distance from any broadcasting station at which reliable satisfactory reception will be possible. The various kinds of man-made interference, on the other hand, are curable and are of local character; it can be expected that more and more localities will be freed from the various types of this pest.

Increase of knowledge and of practical applications characterize all phases of radio. We are coming to have a picture of the machinery by which the waves are propagated. Remarkable discoveries are being made in the behavior and potentialities of the waves of hitherto unknown frequencies. We are learning to direct the waves in a desired direction. The battle against interference is being won in spite of enormous increase in the use of radio.

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Responsibility of the Individual

Particular Interest Taken in Individuals of Traffic Department Because They Come into Closer Contact Daily with Public Than Any Other Employes—Paper Presented at Peoria Traffic Conference of the Illinois Association

By Frank V. Newman,

General Manager, The La Porte Telephone Co., La Porte, Ind.

Today I am particularly interested in the individual employe of the traffic department for this reason: That they come into closer contact daily with the public than the employes of other departments of our business.

We realize the necessity of the use of "The Voice With the Smile," as we do not come face-to-face with the patron but serve him over the wire. Like the little grain of sand which filters through the hour-glass, the individual calls, one by one, make the sum total of the day's traffic.

Traffic experts allow 2 per cent errors per day. It is this 2 per cent that is constantly roiling the waters. It has fallen to my lot often to make an analysis of this 2 per cent errors, and usually they can be traced to the failure of some individual.

As an illustration: One subscriber, who gave us repeated complaints that he was called for the wrong number, was in a favorable attitude on account of our endeavor to overcome the error; but like a bolt of lightning, although we were going good, an outside office called for the incorrect number and the error was not discovered until it landed—just in the place where we didn't want it to strike. Then one of our operators stumbled and misplugged the multiple, causing error No. 2, with the result that all of the reformation work we had accomplished had to be started all over again.

In observing our local service about 8:30 in the evening, I noticed that one of the operators, who evidently was tired from her day's work, drawled out the number when verifying it to the subscriber in the announcement to the patron that the particular number called for was "busy"—and there was again that same lack of "pep," all of which gave the impression to the patron that the telephone service was "all in" at that time of the night.

It is true that we have accomplished much in the past in the way of education along the lines of courtesy, affability, speed, efficiency, etc., but how many patrons advise that the telephone service failed when they needed it mostly? I am always reminded while living in a city in Michigan, where the city water was only fit for sprinkling purposes, how we all thought that it was the most wonderful water, after we were deprived of it for three months on account of the water pipes freezing.

Our successes each day, by little acts of courtesy and the wonderful initiative which the employe displays are soon lost sight of, like the chip which floats down the stream, but our failures stand out prominently.

Courtesy begets much. I am really ashamed to admit that an official of the state automobile association visited our town and spent two weeks making small purchases. In order that our townspeople would not know who he was, he piled his car with luggage and displayed a license of another state.

Consider the Employe as an Individual, Says Mr. Newman, Particularly the Traffic Employe.

Whenever he made a purchase, he mentioned the fact that he was driving through, but not in any case did anyone have the courtesy to ask him where he was from, or where he was going—yet our portion of tourists' business is estimated at $55,000 a year.

After a meeting at which this official spoke, adjourned, I asked him what his treatment had been from the telephone employes, and he replied that they had been courteous in every instance, and he wished that we might be able to instill in the merchants' minds what courteous treatment meant.

You were sent here to represent your company; are you going to make a real honest effort to put into practice the good things which you heard today? Or will you be like the telephone manager who attended all of the meetings and when asked why he did so, stated because he believed it was his duty and that he went home and told the folks all about it? But does he, or does he forget about it?

Do you disseminate the knowledge you have obtained at the traffic conferences? When you go home, why not gather your associates around you and tell them of the things learned thus making the expenses of your coming to this convention a real investment.

I am reminded about the story of the minister who called on one family who were members of his church. He asked if he might look at their Bible. After some effort they produced it, and the lady wiped the dust off the cover. In looking over the pages, he noticed that they were practically new. He advised the lady that evidently the Bible had not been in use very much as there were not even thumb marks on the paper. Will this be the same result with the rule book?

How many present today have the privilege of reading TELEPHONY? We must take off our hats to Stanley Edwards, the editor, and his associates, who have so exceedingly well published the articles that have much to do with making a more efficient telephone service in this country.

In many of the telephone offices receiving TELEPHONY it is left on the manager's desk and is not passed around to the employes. One of the accomplishments in our office is passing it around to employes. Miss Norris is provided with a subscription to TELEPHONY and every supervisor has the privilege of reading the articles. When they have finished, the copy is left in the restroom for the operators' use.

When TELEPHONY offered prizes in their competition course, six of our employes submitted papers. Maybe we didn't receive a prize, but those six girls received a profitable experience.

What will avail holding these conferences, to publish articles, endeavoring to educate both the public and the operator, if we, as individuals, do not take hold and lift and assume responsibility. Has it ever occurred to you as an employe, how valuable the education and training you receive in the telephone business will be to you?

Only yesterday the county agent of our county, who had the good fortune to em-

ploy one of our former supervisors, related how wonderful it was that she got the telephone calls through so quickly, and that she had the numbers memorized which he wanted to call. He understood all about it because he realized the training which the operators receive.

The idea of a correspondence course suggested at the traffic conference held during the national convention should be endorsed in order that the operator in the small exchanges would have this advantage. Your association has gone to the trouble and expense of providing an instruction book of local rules. Have you read these over carefully and put them into practice? Again it is up to the individual.

It is unfortunate that many small offices are not in a position to give training to the operator. The usual method is to invite the new applicant to sit down at the board and absorb and acquire all she can —and usually she absorbs the wrong ideas, for sometimes our attitude is one that does not make for service toward certain people in the community; that so-and-so is very cranky. All of this might well have been forgotten as the new operator may not have the same experiences with the patrons as the previous one.

I recall an incident where I had occasion to visit a town where there was an Independent company operating a one-position board. Upon inquiry for the manager, the operator very courteously advised me that he was out. Then she asked my name and whether there was anything she could do.

When she ascertained the company I was connected with, she said she had placed an application with our company and that it had been accepted, but that she would not leave her present employment until she had found a suitable person to fill her position.

This act on her part rather aroused my interest in her, and I am pleased to say that today she is one of the supervisors of our company. I mention this because employes never know what positions or advancements are in store for them, frequently when they least expect it.

If you were to become interested and have a conversation with many of the individuals present, you would no doubt find that, as a rule, they had to start their experience in the telephone business in a minor position. What was it that promoted them?

It was their own self-advancement, of not only doing the thing but making the most of every opportunity. One of the things brought out in the presidential election was the early life of President Coolidge, his attention to details and his thorough work. Don't just be satisfied with doing the thing in a mediocre sort of way, but make every act count as a finished product.

A street railroad official stated the volume of calls in our telephone exchange was indeed small compared to the number of business transactions they had each day. Every fare paid on the street car was a business transaction. The passenger bought the transportation and the company sold it.

Is this not equally true of every individual call which the patron makes over the telephone? Consequently, is it not necessary to pay particular attention to each individual call?

We hear much today of the problems of automobile traffic regulation and traffic laws, but does it not really depend to a large extent upon each individual driver? Should not the driver of the automobile from the small town become acquainted with the regulations in the larger cities, and would his knowledge not enable him to avoid delays?

Just so with the patron of the telephone company and the operator in the small town. The question was asked, "What is a village?" and the reply was, "A village is the place where you can call Central and ask if she heard whether it is a girl or a boy."

We hear of the many accounts of heroism on the part of the telephone operator and citations for her courage and bravery, but do the employers commend the individual acts on her part which make for efficient service? We may often be quick with our criticisms, but are we equally so with our commendations?

We get back to the spirit of service. How grateful we are when our friends do an act of kindness toward us, but the public sometimes is very slow to commend the individual. "A Tale That Is Told" with the compliments of the Washington Home Telephone Co. has this concluding paragraph:

"Whosoever would be greatest among you,
Hearken to my call,
I am the Spirit of Service."

In discussing the field of traffic conferences and operator schools, one who was the pioneer and had the privilege of holding many schools declared that there was a stimulation of the service after one of these conferences, but, unfortunately, like other stimulants, the effect soon wore off.

Let each individual determine within himself that it will not be a stimulant but a daily task like the boy scout, whose oath states that he will do one good deed every day. Let us make them all good deeds every day. Douglas Malloch illustrates this well in the "Second Fiddle":

I like the little fellows who don't count
for very much;
It isn't from the 'cellos that you get the
finer touch;
The roaring of the basses and the rattle of
the traps
May have their proper places in the harmony, perhaps;
But down there in the middle, inconspicuously there,
Is the little second fiddle that is carrying
the air.

The crashing of the cymbal shakes the
ceiling with its "Blam!"
The piccolo is nimble; "Boom!" you hear
the drummer slam;
The trombone slides and screeches; "Tut,
tut, tut," the proud cornet
Just a little higher reaches than it's ever
tutted yet;
The Main High Diddle Diddle runs his
fingers through his hair—
But the little second fiddle still is carrying
the air.

We talk about the bosses with the big
and busy brains;
Making profits, taking losses—but the boss
would boss in vain
If he didn't have assistance, someone handy
he could trust;
He would never go the distance, and the
company would bust.
Here's the secret of the riddle of successes ev'rywhere—
There's some little second fiddle that is
carrying the air!

Who is this second fiddle but the individual operator.

West Central Indiana Association Elects Officers.

M. L. Clouser, manager of the Thorntown Telephone Co., Thorntown, Ind., was reelected president of the West Central Indiana Telephone Association at the annual meeting held December 17 at Danville, Ind. John Stanley of the Ladoga Telephone Co. was elected secretary, and Dalton Waller, manager of the Indiana Bell Telephone Co. at Crawfordsville, vice-president.

The West Central Association covers 14 counties located in central Indiana. There are represented in the association 163 telephone exchanges and 37,000 telephone subscribers, employing 1,040 persons.

This was one of the best meetings ever held in the history of the association. There were lively discussions and a keen interest was taken in them as well as in the addresses of the day. The principal speaker was Henry A. Barnhart, president of the Indiana Telephone Association. President Clouser made an address in the afternoon, following an address by C. A. Breece of the Indiana Bell Telephone Co. of Indianapolis.

An operators' school was held in connection with the meeting, in charge of Lloyd Wayne of the Indiana Bell Telephone Co. of Indianapolis, assisted by Miss Delbridge.

The next meeting of the association will be held at Sullivan, Ind., in March, 1925.

Company Reports Expenses Increased More Than Revenues.

The Kearney (Neb.) Telephone Co., of which Warren Pratt is head, reports to the state railway commission that for the first 11 months of 1924 it was able to earn and pay its usual 6 per cent dividend and pass $3,534 to undivided profits.

The company has assets of $302,247, of which $282,444 represents the permanent and long time investments, $17,060 the

working assets and $2,743 deferred debit items. Against these are bonds of $80,000, common stock of $89,650, preferred stock of $50,000, reserves for depreciation of $56,576, and a surplus of $13,350.

Exchange revenues for the 11 months totaled $56,033.85, an increase of $2,139.97, and toll revenues, $11,462.74, an increase of $652.09, a total revenue of $67,496.59 and an increase of $2,792.06.

Operating expenses were $23,422.93, an increase of $1,877.38; maintenance, $9,353.53, a decrease of $89.27; depreciation, $18,146.47, an increase of $789.27; taxes, $1,795.55, an increase of $230.15. Total expenses were $52,718.49, an increase of $2,807.53.

Sundry earnings were $86.94, an increase of $58.67, leaving the net telephone earnings $14,778.11, or just $15.47 less than for the corresponding period in 1923. The company paid interest for the period of $4,546.63. Net profits were $10,318.42, of which $6,784 were set aside for dividends.

The average plant in service was $268,925; average capital obligations, $219,650; average capital stock, $139,650.

The company stations in service on December 1 were 2,442, an increase of 109 since the first of the year. The average monthly revenue per station is $2.559, as compared with $2.553 a year ago.

The total revenue to average plant in service was 26.68 per cent; operating expenses to telephone revenue, 34.70; telephone expenses to telephone revenue, 75.11; maintenance to average plant in service, 3.72; depreciation to average plant in service, 7.13. Net telephone earnings to plant in service were 5.80 per cent; net telephone earnings to average capital obligations, 7.30 per cent.

Personal and Biographical Notes

Lloyd B. Wilson, for the last five years general commercial superintendent of the Northwestern Bell Telephone Co., with headquarters at Omaha, Neb., has been appointed commercial engineer of the American Telephone & Telegraph Co. at New York. This promotion is another striking instance of how far a man may climb who studies the job ahead of him while acceptably holding down the one he is getting paid for doing. Mr. Wilson is still well under 50.

His first job was, as a boy in his late 'teens, as a combination man for the Bell at the exchange it then operated in Plattsmouth, Neb. In the daytime he climbed poles, after helping dig holes for them and to set them, and strung wire and did various bits of repair work. In his evenings he studied the switchboard and learned its construction and operation. This was in 1898. He was transferred to Lincoln in 1901 as an inspector's helper. Later he became inspector, and in 1903 was sent to Central City to be manager of the Nebraska Bell exchange there.

It was in the field of the commercial department that Mr. Wilson first won his spurs. His exchange had 150 town subscribers and none in the rural districts. In three years he had run the town total up to 750 and had a large farm patronage in the surrounding territory.

The next seven years were spent at Grand Island as manager for that district. From there he climbed into the state manager's job and from there went to Minnesota to become state commercial superintendent. The next step was to the position of general commercial superintendent, taken five years ago.

Mr. Wilson is a director of the Nebraska Telephone Association, and is one of the best liked men in the business in the West. He has the diplomatic temperament, and as this is combined with a winning personality and what his friends affectionately term "a golden smile," he has been of tremendous aid to his company in straightening out rate tangles and service conditions.

While functioning well as a liaison officer with the public, he has also developed the business of the company so efficiently as to receive the call to a bigger job with the parent company.

Nathaniel T. Guernsey, vice-president and general counsel of the American Telephone & Telegraph Co., gave a series of lectures before the department of commerce of the University of Iowa on December 10, 11 and 12, on the subject of "Regulation of Public Utilities."

Mr. Guernsey is a graduate of the law school at Yale. He was born in Davenport, Iowa, and for many years practiced law in Des Moines.

Obituary.

Edward O. Arnold, director, vice-president and treasurer of the Mt. Vernon Telephone Co., Mt. Vernon, Ohio, died very suddenly the morning of December 15 while attending a meeting of the directors of the Knox County Savings Bank. Apoplexy is believed to have been the cause of his death.

Mr. Arnold was one of the founders of the Mt. Vernon Telephone Co. and until a few years ago was business manager of the company. He was 61 years old at the time of his decease.

He was a life-long resident of Mt. Vernon and prominent in business and public affairs. For many years he was a director of the Knox County Savings Bank and at one time was a vice-president. Recently he had devoted much of his time to the affairs of the bank.

He was vice-president and a director of the Knox Savings & Loan Association, being connected with the institution for 26 years, and was the last of the original directors of the association. He was a director of the Mt. Vernon Homestead Mortgage Co., having been affiliated with the company ever since it was organized about five years ago.

Mr. Arnold was a director of the Knox county branch of the American Red Cross, and was prominently identified with the Mt. Vernon Y. M. C. A. He had other business holdings which occupied much of his attention. He was a member of the Mt. Vernon Country Club.

He is survived by his wife, Carolyn MacFadden Arnold, and six children.

Earl Rodman, of Tuscola, Ill., wire chief for the Douglas Telephone Co., was killed December 9 at Homer when he touched a stay wire which was crossed with a wire carrying 2,300 volts on one of the I. P. & L. system circuits, while attempting to run down a case of telephone trouble.

In speaking of the accident, Manager Robideaux stated that while Mr. Rodman was not afraid of anything in his line, he was always very careful and never took any unnecessary chances. He said the accident happened after every safeguard seemed to be taken and that the position of the live wire across the stay wire was such that it was almost impossible to see it.

He stated also that while Mr. Rodman held the title of wire chief of the company, he was in reality much more than that and was practically in charge of outside and inside work of the company. He knew every part of the business and could always "spot" and correct any trouble.

"Rod," as he was generally known about the company office and by his friends over town, was popular with everyone with whom he came in contact and deservedly so. He was of a quiet, unassuming disposition, but was always courteous and pleasant and made a person asking him for something feel that he was under obligation for having been asked to help.

He was also an inventor and for some time had on the market an automatic device for telephones, which he had lately improved and which was coming largely into use at the time of his death.

Mr. Rodman is survived by his wife, prominent in Tuscola as a violinist, his parents and two sisters. He was 39 years of age.

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Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchise, Rates and Service

Asks Commission Regarding Stopping Service for Radio.

The Nebraska State Railway Commission has had an unusual question put up to it by Mrs. L. B. Brown of the Maxwell-Brady Telephone Co. The company has a ringing machine. Radio fans in the two towns are insisting that this machine to put out of service during the evening when radio programs are being broadcasted.

Mrs. Brown says that she is willing to have the operator accommodate, but that she believes the first duty of the company is to serve its patrons and not act so as to please the radio fans. She asks the commission to make a rule to cover the matter for the guidance of companies generally, this being a live question in a number of towns.

Sweeping Investigation of New England Bell Is Sought.

Officials of 32 cities and towns of Massachusetts, meeting at Boston on December 9 to discuss the proposed increase in telephone rates, voted unanimously in favor of a resolution asking the legislature to pass a bill which would authorize a sweeping investigation of the New England Telephone & Telegraph Co.'s relation to the parent Bell system. The investigation would be made by the state public utilities commission.

Chairman Henry C. Atwill of the commission announced that a preliminary hearing would be granted protestants against the proposed new telephone rates early in January. Regular hearings before the commission will follow.

E. Mark Sullivan, corporation counsel of Boston, who will lead the opposition, agreed with Attorney Charles S. Pierce, for the company, that about February 1 would be a good time to open the regular hearing. Ralph A. Stewart will lead the array of counsel for the company.

Mr. Sullivan criticized the company for waging an advertising campaign for an increase in rates before the hearing is held.

Rate Schedules Effective on Consummation of Purchases.

The Mississippi Railroad Commission, on December 4, approved the rate schedules filed by the Cumberland Telephone & Telegraph Co. for telephone service at Corinth, Tupelow, Boonville, Nettleton, Amory, Okolona, Aberdeen, Prairie, Shannon and Verona, to become effective upon the consummation of the purchase of the telephone properties at those points of the Sun Telephone & Telegraph Co. and the Southern Telephone & Telegraph Co.

The commission found that the rates for service heretofore approved and now in effect in the exchanges at Corinth, Tupelow, Boonville and Nettleton now being operated by the Sun Telephone & Telegraph Co., and in the exchange at Amory, Okolona and Aberdeen now being operated by the Southern Telephone & Telegraph Co., would not be improperly discriminatory, and that the proposed rates for service by the Cumberland Telephone & Telegraph Co. in the exchanges at Prairie, Shannon and Verona, being the same as those now in effect at those exchanges, would not be improperly discriminatory against any person, corporation or locality.

The commission, therefore, held that the Cumberland Telephone & Telegraph Co. should be authorized to place in effect the following rates for service:

Aberdeen, Amory, Okolona and Boonville—Business, one-party, $3.50, two-party, $3, five-party, $2.50, extension, $1.25; residence, one-party, $2, two-party, $1.75, four-party and five party, $1.50, extension, $1; rural, $1.25, applicable to Boonville only.

Corinth and Tupelow—Business, one-party, $3.75, two-party, $3.25, five-party, $2.75, extension, $1.25; residence, one-party, $2, two-party, $1.75, four-party and five-party, $1.50, extension, $1.

Nettleton—Business, one-party, $2.75, two-party, $2.40, five-party, $2, extension, $1.25; residence, one-party, $1.65, two-party, $1.40, five-party, $1.25, extension, $1.

Prairie, Shannon and Verona—Business, one-party, $2.75, two-party, $2.40, extension, $1; residence, one-party, $1.65, two-party, $1.40, extension, 50 cents.

Duluth Telephone Rate Case Appealed to the Supreme Court.

An appeal to the Minnesota Supreme Court from the decision of District Judge C. R. Magney on November 10, affirming the order of the railroad and warehouse commission, December 28, 1922, granting the Northwestern Bell Telephone Co. an increase of $1 a month on residence and business telephones in Duluth, was filed by J. B. Richards, city attorney, in district court on December 12.

Judge Magney said that he was very glad that the city had decided to appeal the case, since it would give residents of the city an opportunity to satisfy themselves as to the justice of the ruling. Under the rules of law only such information as had been presented to the railroad and warehouse commission was allowed in the district court hearing. If the supreme court decides that the ruling of the railroad and warehouse commission is unfair, the application for an increase in rates will be sent back to it with certain recommendations.

The chief point of contention was in regard to the basis for the amount of income for the investment in Duluth. Mr. Richards held that the telephone company should base its rate of income on that from the entire state and not from individual stations.

The fight on the increased telephone rate began in 1922, when on December 28 the railroad and warehouse commission granted an increase effective January 1, 1923. With so little time in which to work, the city attorney first obtained a court order restraining the telephone company from collecting the increase. This was granted by Judge Magney on December 29.

On January 2 he dismissed the order and immediately after Mr. Richards obtained a similar order from Judge Fesler. This, too, was dismissed, and subsequently the attorney-general, Clifford L. Hilton, appealed from the commission's ruling and obtained a restraining order. Later the company agreed to abide by a court decision. The decision by Judge Magney followed.

Sets Aside Commission Order Abolishing Perrin Exchange.

In an opinion handed down December 8 by Judge William H. Utz in the circuit court at St. Joseph, Mo., the court found for the subscribers in the case of the Clinton County Telephone Co., holding that the company must maintain its telephone exchange at Perrin.

The company desired to abandon the Perrin and Converse exchanges, declaring that they were operated at a loss. The case had been before the state public service commission. The court sustained the commission in abolishing the Converse exchange, but set aside the order abolishing the exchange at Perrin.

Judgment for Wrongful Trimming of Trees Reversed.

A judgment against the telephone company, in the case of the Millersburg, Wooster & Orrville Telephone Co. vs. Etling, for alleged wrongful trimming of trees was reversed by the Ohio Court of Appeals because of the ruling of the lower

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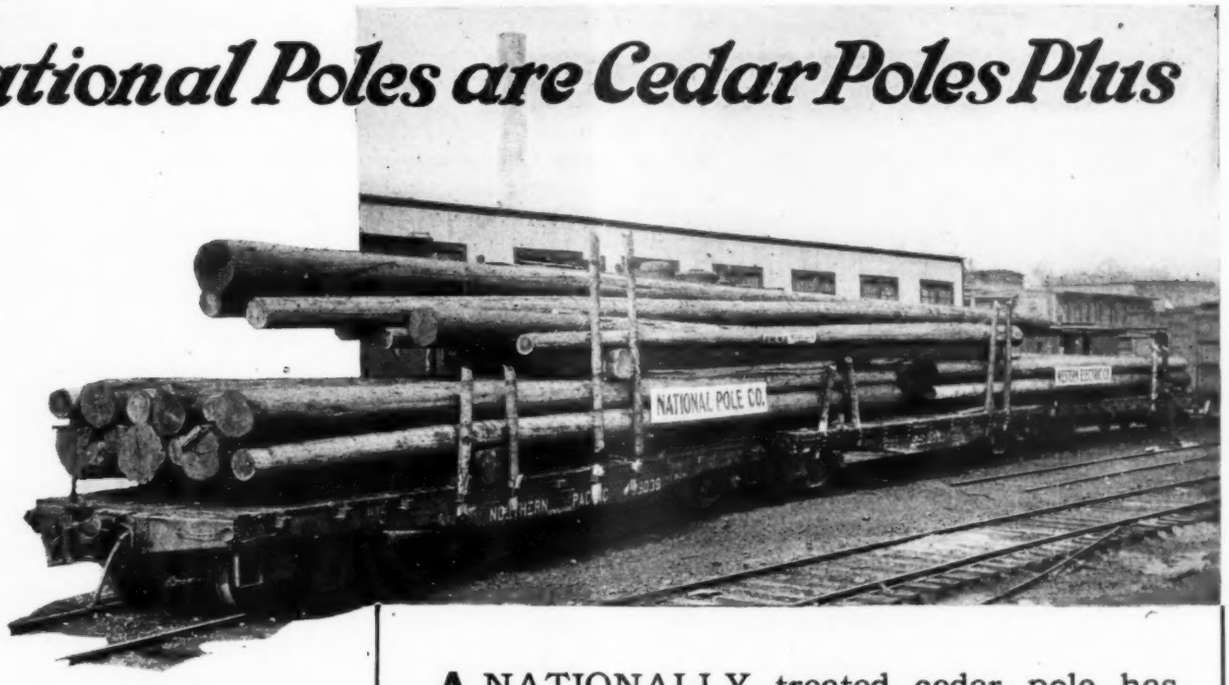

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court excluding photographs of the trees. The court held that to recover damages for alleged wrongful maintenance of wires in front of property, the plaintiff must prove impairment of egress and ingress or of easement of light and air. The court held:

1. That the lower court erred in refusing to admit in evidence photographs of the tree, which were made by a competent photographer a few days before the trial; since they were properly verified, they were reasonably accurate representations and would have tended to prove as one item of evidence the condition of the tree at the time they were taken, as bearing upon the fact whether the trimming was injurious or not.

2. That where the evidence showed that the company did not place poles in front of plaintiff's property and the petition did not allege that the construction and maintenance of wires over the grass plat in the street interfered in any way with plaintiff's access to her property, or that they interfered with or impaired her easement in the street for the purposes of light, air and view, the petition did not state a cause of action as to the wires.

Gives Informal Consent to Cutting Off Free Service.

The Nebraska State Railway Commission has given its informal consent to the cutting off of certain free service that has been given for years by the Gage County Telephone Co., of Blue Springs, to the subscribers of the Odell and Liberty Telephone companies. Under the terms of an agreement, the subscribers to each of these exchanges are given a free interchange of service with the subscribers at Blue Springs.

The Odell and Liberty companies also publish that each gives a free interchange of service with the other, but they are physically unable to do this, and have been using the exchange of the Gage County company at Blue Springs for this purpose. The latter company finally tired of doing all of this plugging for nothing and presented the matter to the commission to ascertain if they could not get needed revenue out of the service.

As an inspection of the tariffs on file showed that the Gage County company has authority to make a toll charge for every non-subscriber who uses its service, whether in the city or to any of the free service towns, the commission said that this covered the situation, since the subscribers to the Odell and Liberty companies naturally fell into that class. No hearing or order was, therefore, deemed necessary.

"It is quite plain," commented Chairman Browne, "that the Odell and the Liberty companies had an undisputed right to agree between themselves to divide the clothes of the Blue Springs company, but they have no power to force the latter to give them its clothes, nor does the commission."

Increased Rates for Southwestern Bell at Ponca City, Okla.

The Oklahoma Corporation Commission recently granted the application of the Southwestern Bell Telephone Co. for increase in exchange rates at Ponca City. The commission found that the company now has a first-class plant and service there. The commission holds that the exchange should be considered as a unit as regard to toll and should be credited with the regular toll commission as approved by the commission and the same as paid all connecting companies in the state, that is, three cents plus 15 per cent on all "out" business and four cents on all "in" business. A reasonable value of the plant less depreciation is found to be $213,246.63. The following rates are to become effective January 1, 1925:

Local Exchange: Business—individual line stations, $4.50 per month; two-party, $4; extension, $1. Residence—individual line stations, $2.50 per month; two-party, $2; four-party, $1.50; extension, 75 cents. Rural owned line and station, $1.50 per month; rural switched, 50 cents per month.

Private Branch Exchange: Trunks—commercial or hotel, $6.75 per month. Stations—commercial, $1; hotel, 50 cents; hotel desk set, 65 cents.

Private Branch Exchange Switchboards: Cordless—for three trunks and seven stations, $4 per month; five trunks and 12 stations, $5. Cord—30 line, equipped, $6; cord, 80 line and over, equipped per station, $12 per month.

Protest Sale of Bell Equipment to Local Company.

Strong protests have been entered by the business men of Doniphan, Neb., to the state railway commission over the sale by the Northwestern Bell Telephone Co. of its equipment and service at that point to the Hamilton County Farmers company. The Bell has undertaken this sale for the purpose of clearing up an irregular situation.

Doniphan is close to Grand Island, a Bell exchange city, and because of the close business relations between the two towns the Northwestern Bell company has furnished service to all of the business men of Doniphan, who pay the Grand Island business rate of $4.95 a month.

The Hamilton County Farmers company has maintained an exchange in Doniphan, serving the remainder of the community and switching the business subscribers there who took Bell Grand Island service. Its subscribers also had the right to secure Grand Island by paying an additional sum.

The Doniphan business men say that the result of the sale will be disastrous to them. They have been willing to pay the Grand Island rate because they have much business to transact there, and the monthly rate is less than tolls would be. When they are turned over to the Hamilton County company, however, they say they will be under the handicap that all their patrons in the adjoining territory, who have Bell connections with Grand Island, and also now have with Doniphan, will do their business in Grand Island, because they will have to pay toll to Doniphan.

They also complain that the Hamilton County company is seeking to make them pay a new installation charge, and that they ought to have some option as to what service they take and pay for.

Rules Against Legality of Signature Acknowledgment.

An acknowledgment to a signature over the telephone was declared void recently by Judge Louis Lightner of Platte county, Neb. The case is to be at once appealed to the supreme court, as in the ordinary transaction of business many acknowledgments to documents are taken over the telephone, the party to whom it is read assenting. California has held such an acknowledgment valid, while Florida has held it void. These are the only two states that have so far passed upon the question.

A farmer named Nott, in Platte county, traded his homestead to Arthur Bleyhl for land in Kimball county. While waiting for Bleyhl to clear the title to his land, the papers in the case were signed and then placed in escrow with a bank, possession of the land being exchanged. Nott became dissatisfied and sued to have the deal declared off. His wife, it turned out, had not accompanied him to town, but had with him signed the deed to their homestead, and her acknowledgment of the signature was taken over the telephone.

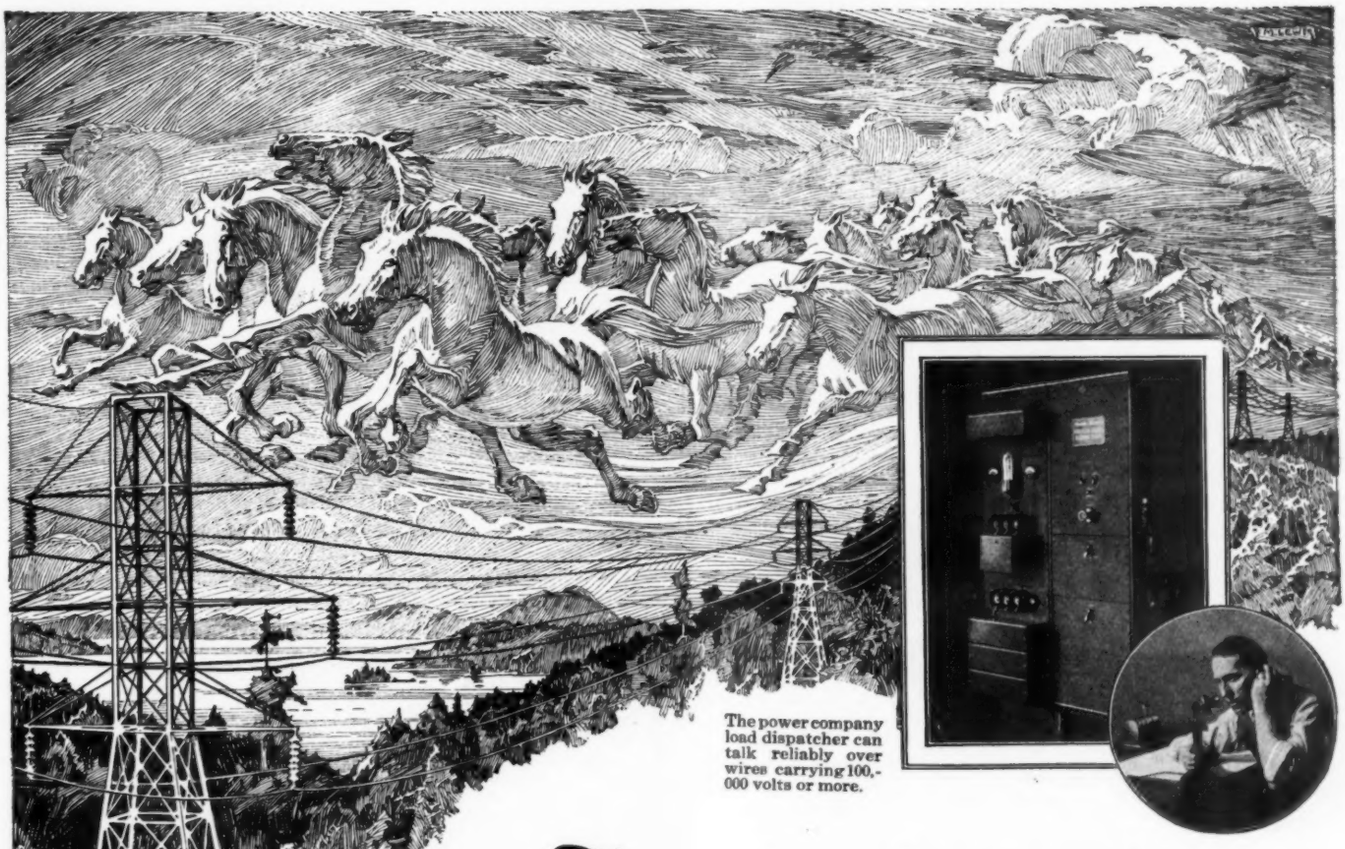
Judge Lightner held the equities were with Bleyhl, but that the law means an appearance in person, and a person cannot be projected over the telephone, even though the voice is. He said the supreme court had always been keen to protect homesteads, and has been extremely technical in its holdings in order to maintain that policy.

Small Company Asks Commission Regarding Collection Problems.

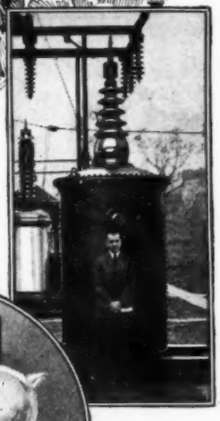
Owners of small telephone companies may be able to advise the Nebraska State Railway Commission in a matter just brought before it by the East Deer Creek Telephone Co.

It has a stockholder who is two years behind in his rentals. He was cut off, but he refused to stay that way. When the company wasn't looking he coupled up with the service, and now dares the manager to put him off. The manager would like to be informed what he can do about it.

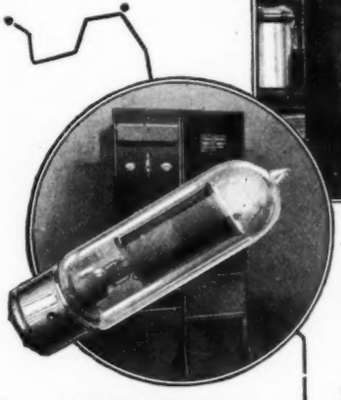
There is also the case of two patrons on



The power company load dispatcher can talk reliably over wires carrying 100,000 volts or more.



Not a giant chessman. This coupling condenser gives the voice currents safe conduct from telephone instruments to power line.



Amplifying vacuum tube. This is one of a number of vacuum tubes used in the transmitter circuits.

On a cross country power line any station can talk with any other — with Western Electric equipment.

The voice that rode 100,000 horse power

RIDING astride horse power enough to run an industrial city, came the voice over the wire, "Bad storm put Mill City line out of commission, tie in Springvale circuit."

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one line. One of them pays promptly and the other doesn't. This results in spending more money to collect than the rentals amount to.

The company desires to know if it has power to refuse service to the poor pay and take down the line from the other because of the expense involved.

Questions Transferring Subscribers to Other Exchanges.

The old row at Endicott, Neb., with the Lincoln Telephone & Telegraph Co. has broken out afresh. The people won't pay rates sufficient to give good service and won't buy the exchange so that they may run it themselves. In order to relieve the situation, the company has been attaching as many patrons as will consent to the adjacent exchanges of Fairbury and Steele City.

To prevent abandonment of the exchange, the representative from that county got the legislature to pass a law that prevents the abandonment of exchange service unless 60 per cent of the patrons consent in writing. The law is so drawn that it applies only to the large companies, and for that reason the lawyers say the law is not worth the paper it is printed on.

Now comes to the Nebraska State Railway Commission a petition signed by a number of citizens asking that the commission order telephones attached to the Endicott exchange be placed in the two railway depots in the small town and that the company quit trying to secure the transfer of the service to these other two exchanges.

The depots and a number of others prefer the Steele City or Fairbury exchange, to which the depots are connected, but the protestants insist that this is a great inconvenience and causes great delay.

The chief objector is President Fairchild of a brick-making company. He says that the company's agents used misrepresentation in getting the changes made, and that even if the exchange is losing money it ought to be continued because the system as a whole is making money. He says that the company wants too much for the property or citizens would buy it.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION, WASHINGTON, D. C.

December 10: The commission authorized the Bell Telephone Co. of Pennsylvania to acquire certain properties of the Kittanning Telephone Co., of Kittanning, Pa., and the Kittanning company to acquire certain properties of the Bell.

ARIZONA.

December 16: The commission authorized the Mountain States Telephone & Telegraph Co. to acquire the Arizona Electric Telephone Co., serving Holbrook and Winslow, and the Lordsburg-Duncan exchange, serving those cities.

CALIFORNIA.

December 12: Santa Monica Bay Telephone Co. authorized by the commission in a supplemental order to execute a mortgage of deed of trust as previously approved by the commission.

December 12: Home Telephone Co., of Covina, authorized by the commission to issue and sell $65,000 additional of its general and refunding 6 per cent bonds due September 1, 1953, and to issue $95,000 of notes at 6 per cent.

ILLINOIS.

December 10: The National Telephone & Electric Co. petitioned the commission for permission to increase rates in Farmer City, Weldon, Kenney, Waynesville and intermediate localities in DeWitt county and in Mansfield, in Platt county.

MICHIGAN.

December 22: Application filed by the Michigan Bell Telephone Co. for permission to issue $15,000,000 additional common stock. This would increase the common stock of the company to $65,000,000. The additional capital would be used to retire $15,000,000 of the present $21,015,000 of equipment notes, now outstanding.

MINNESOTA.

December 23: Hearing at St. Paul in re petition for consent of the commission for the sale of Northwestern Bell Telephone Co. and purchase by the Tri-State Telephone & Telegraph Co. of the exchanges at Marshall, Luverne, Pipestone and Minneota, Minn., and certain associated toll properties. M-1426.

MISSISSIPPI.

December 4: The commission approved rates for service by the Cumberland Telephone & Telegraph Co. at Corinth, Tupelow, Boonville, Nettleton, Amory, Okolona, Aberdeen, Prairie, Shannon and Verona, to become effective upon the consummation of the purchase of the telephone properties at these points owned and operated by the Sun Telephone & Telegraph Co. and the Southern Telephone & Telegraph Co. No. 5610.

NEBRASKA.

December 14: In the matter of the application of the Frontier Telephone Co., of Hubbell, for permission to charge gross and net rates; authorized under the usual rules respecting advance payments by the tenth of the current month.

December 15: In the matter of the application of the Davenport & Kiowa Telephone Co. for permission to issue certain securities; it being represented to the commission that the company does not desire action upon this application at this time, it is, therefore, ordered that it be dismissed insofar as unsold securities are concerned.

December 16: Complaint filed by H. A. Fairchild against the Lincoln Telephone & Telegraph Co., alleging insufficient service and asking order requiring Burlington and Rock Island railroads to put stations directly connected with Endicott exchange.

December 17: Protest filed by the business men of Doniphan against proposed consolidation of exchanges of Northwestern Bell and Hamilton County Farmers Telephone companies at Doniphan.

December 17: In the matter of the application of the Mutual Telephone Co., of Merriman, for authority to issue certain securities; it being the desire of the company to proceed no further with this application, it is ordered that it be dismissed of record, insofar as unsold securities are concerned.

December 18: Application filed by the Ainsworth Telephone Co. for permission to withdraw pervious application for increase of rates, and to substitute request for authorization of gross and net rates.

December 18: In the matter of the application of the Callaway Telephone Co. for permission to charge gross and net rates; ordered that authority be issued under the usual rules governing advance payments.

December 18: Complaint filed by E. J. Mille, banker of Loretto, averring that crosstalk is so great on Monroe Telephone Co.'s lines to Albion that it is impossible to secure privacy for messages, while the telegraph agent declines to take messages on ground he was not hired for that purpose.

December 30: Hearing in the matter of the application of the Bancroft Telephone Co. for authority to increase rates.

NEW YORK.

December 23: Further hearing on the application of Donald J. Cosgrove as mayor of the city of Cohoes asking that the New York Telephone Co. be directed to remove its poles and wires from Columbia street between Simmons avenue and Remsen street in that city. At a hearing December 18 the city showed that it is making extensive improvements in Columbia street, and in order to properly beautify the street it will be necessary to eliminate the telephone poles and wires.

OHIO.

December 8: The commission amended its order of June 20, 1924, in which the Local Telephone Co., of Bellevue, was authorized to sell $157,950 of its 6 per cent preferred capital stock at the highest price obtainable, but at not less than 95 per cent of the par value thereof, to provide that the stock not yet sold, namely $138,050, should be sold for the highest price obtainable, but at not less than 90 per cent of the par value. The commission found the company had made diligent effort to dispose of the stock upon the terms originally prescribed but had been able to sell only $19,900; that it appeared the applicant would be able to dispose of the stock at 90 per cent of par. No. 3103.

OKLAHOMA.

December 17: The commission granted the application of the Southwestern Bell Telephone Co. for increased rates at Ponca City. Order 2062.

December 17: The commission dismissed a complaint filed by the Maramec Telephone Co. vs. Jennings Telephone Co. and Yale Telephone Co., alleging invasion of the territory of the plaintiff company in violation of the convenience and necessity law of 1917. The commission says that chapter 270, laws of 1917, has no application to this case, there being no duplication of exchanges or toll lines, but only an extension of existing facilities, or the broadening of the service of the Jennings and Yale exchanges; and that an exchange area can not be absolutely defined as a certain distance from any exchange, or from the town or city where the exchange is located. Order 2685.

December 17: Application of J. W. Holt for permission to abandon service at the Nelagoney exchange granted effective December 20. The commission found the Nelagoney exchange to be operating at an annual loss and that rates sufficient to afford a reasonable return would be prohibitive.

December 17: The commission required the Medford Rural Telephone Co. and the Southwestern Bell Telephone Co., both operating local exchanges at Medford, to establish physical connection in Medford for long distance service. The Medford Rural is to install the connection and if necessary the commission will prescribe the financial settlement between the two companies.

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of the Medford Rural, living outside the exchange limits of the Bell's Medford exchange, to send and receive toll messages at the regular authorized toll rates. The Medford Rural is to guarantee charges for messages originating on its lines; and give prompt service to subscribers having connections with its exchanges who live outside the Medford exchange limits of the Bell company, who desire toll connection with the latter company. Physical connection is to be installed within 30 days after December 10, 1924. Order 2684.

PENNSYLVANIA.

December 9: New tariff filed by the Johnstown Telephone Co., of Johnstown, providing for increases in rates for P. B. X. switchboards and multi-party business service.

WISCONSIN.

December 22: Oral argument at Madison on the application of the Wisconsin Telephone Co. to apply its standard toll rates between the cities of Eau Claire and Chippewa Falls. U-3088.

December 22: Hearing at Madison on the application of the Juneau Telephone Co., of Juneau, for authority to dissolve its corporation. U-3148.

December 23: Hearing at Madison on the application of the Interurban Telephone Co., of Lake Mills, for authority to increase its rates. U-3153.

From Factory and Salesroom

Illinois Department Store Exhibits S-C Radio Equipment.

The accompanying illustration shows the exhibit presented by the Block & Kuhl Co., Peoria's best department store, at the radio show held recently in that city. Many of TELEPHONY's readers will recognize in the center of the photograph Paul Myers, the Illinois representative of the Stromberg-Carlson Telephone Mfg. Co., with his usual genial smile.

The radio equipment exhibited by Block & Kuhl includes, from left to right, the Stromberg-Carlson No. 2-A console type radio receiver; the Stromberg-Carlson No. 1-A radio receiver; the Stromberg-Carlson No. 1-A loud speaker; the apparatus assembly of the Stromberg-Carlson receiver, and the Stromberg-Carlson No. 1-A receiver mounted on a table.

Quick Replacement of Board Destroyed by Fire at Luray, Kans.

During the week of December 7 the switchboard of the Osborne-Cheyenne Telephone Co., Luray, Kans., was destroyed by fire. Under such conditions, the necessity of restoring service as quickly as possible is, naturally, uppermost in the manager's mind. Still he must select the board which will give him good service.

The Luray Telephone Co. required a new 50-line switchboard, and knowing that the Monarch Telephone Mfg. Co. carried such boards in stock ready for immediate shipment, a telegram was sent ordering a new MC-4945-A floor type switchboard as shown in the accompanying illustration.

The telegram was received the evening of December 11 and on the following day the board was shipped. The Monarch company's prompt shipping service helped greatly toward a quick restoration of telephone service at Luray.

Drafting Room Furniture of Sturdiness and Durability.

Drafting room furniture that "lasts a lifetime" is described and illustrated in the new drafting room furniture catalog, F-24, of the C. F. Pease Co., of Chicago. Durability, sturdiness and finish are three words which best characterize Pease equipment.

The catalog features in various styles, drawing kits, drawing boards, wooden horses, drawing stands and drawing tables, parallel rule attachments, draftsmen's stools and complete line of steel filing cabinets, including sectional filing cases for drawings, tracings, blueprints, specifications, maps, photographs, etc., drawing protectors, etc.

Monarch MC-4945-A Floor Type 50-Line Board Shipped on Short Notice to Luray, Kans., to Replace Board Destroyed by Fire.

Exhibit of Block & Kuhl Co. at Recent Radio Show in Peoria, Ill.

Drafting room instruments and supplies are also presented in the catalog. They include Universal drafting machines of various sizes, boxwood scales, straightedges, protractors, slide rule holders, drawing protectors, etc.

The wooden furniture is made of well seasoned, kiln dried timber. It is designed to stand hard usage and at the same time to make desirable and attractive office and drafting room furniture. All joints are well glued.

The steel furniture is made of cold rolled furniture steel which has been reannealed and pickled to eliminate buckling. All corners are welded so as to eliminate the possibility of any opening of the seams.

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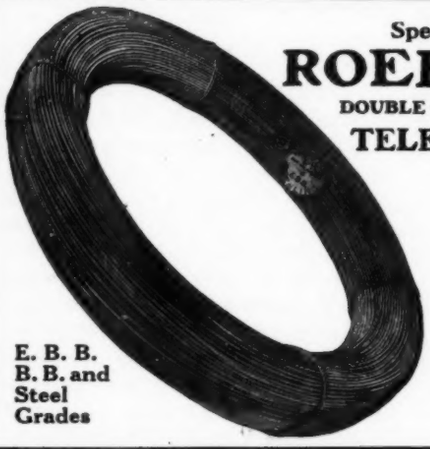

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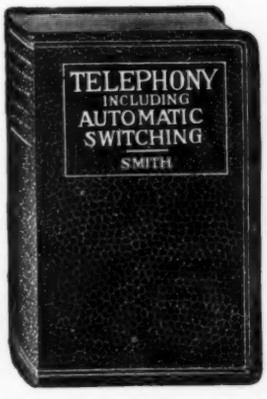

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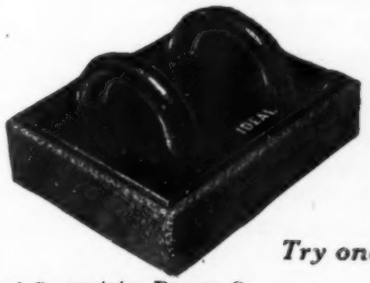
IDEAL

COMMUTATOR RESURFACER



There is an Ideal for practically every machine in telephone work. Tell us the particulars about the one you have in mind and we'll advise the proper size, shape and grade of stone.

Try one without cost

Ideal Commutator Dresser Co.
1051 Park Ave.,
Sycamore, Ill.

We are interested in trying your Ideal Resurfacer. If we like it we will send our confirming order. If it does not come up to our expectation it is understood this trial will have cost us nothing and the incident shall be considered closed. The machine upon which we wish to conduct this trial is a

☐ Charging Generator Type.... ☐ Ringing Machine Type....
☐ Charging Motor Type.... ☐ Coin Collect Machine Type....
☐ Message Register Type....

Firm .....

Address .....

.....

My Name .....

by addressing the C. F. Pease Co., 813-821 North Franklin street, Chicago.

Prices in the Metal Markets.

New York, December 22—Copper—Firm; electrolytic, spot and near by,14⅝c; futures, 14¾c. Tin—Firm; spot and near by, 57.12c; futures, 57.25c. Iron—Firm; No. 1 northern, $24.50@25; No. 2 northern, $23@23.50; No. 2 southern, $20@20.50. Lead—Firm; spot, 9.35@10.25c. Zinc—Firm; East St. Louis, spot, 7.57½c; futures, 7.60c. Antimony—Spot, 14.37c.

Plans of National Carbon Co. for Big Advertising Campaign.

The National Carbon Co. advertising—of Eveready radio batteries, Eveready flashlights and Columbia Eveready dry cells—will appear during 1925 in 1,294,244,472 copies of American magazines and newspapers.

In other words, there will be approximately 12 National Carbon Co. advertisements for each of the 110,000,000 people in the United States. But, when you figure an average of five readers for each copy of every magazine and every newspaper, it means that a National Carbon message will appeal at least 60 times in 12 months to each American old enough to read.

The famous Eveready quartet—flashlights, radio batteries, dry cells and miniature Mazda lamps—has launched forth for the year 1925 on the biggest advertising campaign in its history. A circulation figure which passes the billion and a quarter mark is evidence enough of that.

The gross newspaper circulation for 1925 will be 1,023,579,613. The average circulation of all daily newspapers in the United States for one day is 30,000,000. The National Carbon Co.'s newspaper advertising campaign, therefore, is the equivalent to using every daily in the country for 34 days.

The gross magazine circulation, which includes magazines of general interest, farm papers, technical papers and trade papers, will be 270,664,859. It is accumulated upon schedules which run from six to twelve insertions in the course of the year. In each case the space is eye compelling in size—half-pages, full-pages and double-page spreads.

Each of the Eveready products has its own campaign, designed to register with intensity upon its various markets. The largest are of Eveready radio batteries—naturally the biggest end of an enormous business in this year of radio enthusiasm and interest—and the invaluable Eveready flashlight.

There will be two campaigns in the magazine field. One, in behalf of Columbia Gray Label telephone cells, will be concentrated in six influential trade papers in the telephone field. The big campaign, which will be spread through more than 40 magazines, will run gross copies of Columbia Eveready dry cells advertisements to the extent of 58,589,813. The leaders in the general magazines will be used extensively and the farm papers will come in for a liberal share in copy which will stress the usefulness and excellence of the Columbia Hot Shot battery in agricultural pursuits.

Throughout the entire campaign the National Carbon Co. will carry out the closest cooperation with dealers. Broadsides to the trade will keep it fully advised of each campaign, and window and counter displays in great variety will be supplied as a further aid to dealers who are awake to the possibilities of tying up with so stupendous a background of national advertising.

J. R. Kearney Receives High Promotion by Matthews Corp.

James R. Kearney, for years outstanding figure in the electrical world, has been appointed director of electrical sales for the W. N. Matthews Corp. of St. Louis, Mo., in charge of all electrical sales in the United States, Canada, Mexico and Cuba. He has also been elected a member of the corporation's board of directors.

Mr. Kearney has been identified with the Matthews corporation for some 19 years. During the past three years he has been in charge of sales for all of the United States, during which time he has

Does YOUR Ringing Machine Cause Interference With Radio Reception?

IN MANY communities the Telephone Exchange causes serious interference with radio reception, and enjoyment of radio is consequently spoiled.

The ringing equipment used by the exchange is frequently found to be the cause of this trouble.

Is *your* exchange offending in this manner?

Here is a simple and efficient method of remedying the trouble.

Substitute *Generator Current* for interrupted current by installing a

HOLTZER-CABOT

Magneto-Ringing

Motor-Generator Set

We guarantee our machine, if maintained in proper working condition, will cause no interference with radio reception.

THE HOLTZER-CABOT ELECTRIC COMPANY

6161 South State Street, Chicago, Ill.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

NEW SUBSCRIBERS' SERVICE

From now on Telephony will maintain a Subscribers' Service Plan one issue each month. This service we hope will be freely used by our readers.

Probably in almost every issue of Telephony you see certain articles advertised about which you would like further information. At times you hesitate to sit down and write to each manufacturer. This is where Telephony's Service comes in.

SAVES YOU TIME AND POSTAGE

The fact is Telephony will write the letters for you. All you need do is indicate on the coupon below just what products you are interested in. Then we will see that you get further information.

In case you want facts about some product or equipment not advertised in Telephony, fill in this information in the second space.
Yours for helpful service.

T-13

Subscribers' Service,
Telephony Publishing Corp.,
608 So. Dearborn St., Chicago.

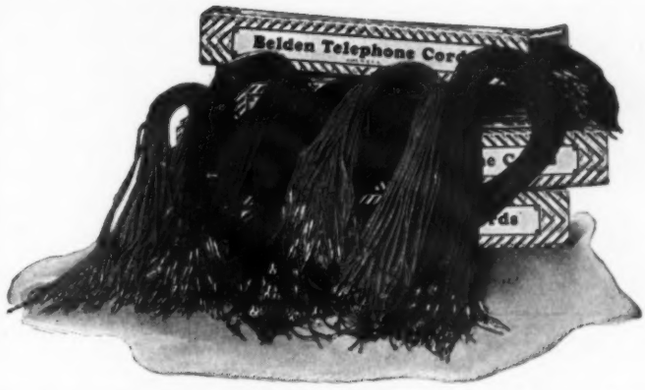
Please advise the firms listed below to send descriptive matter concerning their product as advertised in Telephony.

NAME	ADDRESS	PRODUCT

This is space to use if the product is not advertised in Telephony

NAME	ADDRESS	PRODUCT

Your own name here..... Co.
Address ..... Title
Street ..... City ..... State



Belden Telephone Cords

are carried in stock equipped with terminals for all standard types of apparatus, ready for immediate use. Standard Desk Stand and Receiver Cords are available in an extensive variety of styles and finishes.

These cords are equal to any cord on the market today, regardless of price—yet, our prices are attractive. Let us send you a sample Belden Telephone Cord for inspection and testing. The outstanding quality of workmanship and materials will surprise you.

Read these construction details

1 Eighteen strands of best copper tinsel in every conductor.

2 Heavy braided cotton cover next to tinsel conductor.

3 Second braided cover gives each conductor additional insulation.

4 Conductors enclosed in overall braid of plain cotton, mercerized cotton, worsted or silk as preferred.

5 Tips are securely soldered. No corrosive fluxes are used.

Test a Belden Cord at our expense

Mail this COUPON

Belden Manufacturing Company,
2304 S. Western Ave., Chicago, Ill.

Please send me a sample receiver cord, FREE for test purposes. State style of finish preferred.

Name of Company.....

Address .....

Name of Individual.....

Position .....

Valuations—Supervision—Plant—Inductive Interference
Expert Administrative Counsel for Utilities
JAY G. MITCHELL
TELEPHONE ENGINEER
Member A. I. E. E.
1042 W. Monroe St. Springfield, Ill.

Frank F. Fowle & Co.
Electrical and Mechanical
ENGINEERS
Monadnock Building CHICAGO

CONSULTING
Telephone Engineer
GARRISON BABCOCK
800—20 East Jackson Blvd., Chicago, Ill.
Telephone Wabash 5213

HAROLD L. BEYER CHARLE M. MANLY
BEYER & MANLY
Attorneys and Counselors at Law
Specializing in Telephone Law and
Procedure and Income Tax Practice
815½ Fourth Ave. Grinnell, Iowa

W. C. POLK
CONSULTING TELEPHONE ENGINEER
Plans, Estimates and Reports,
Appraisal and Supervision
Can arrange a moderate amount of financing.
Telephone Bldg. Kansas City, Mo.

W. H. CRUMB
Telephone Engineer
9 South Clinton St. Chicago

TELEPHONE ACCOUNTING
"COFFEY SYSTEM"
The Independent Standard
Coffey System and Audit Co., C. P. A.
607 Peoples Bank Bldg., Indianapolis, Ind.
Exclusive Telephone Accountants

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys,
Financial Investigations, Organization,
and Operation of Telephone Companies.
J. G. Wray, Fellow A. I. E. E.
Cyrus G. Hill
1217 First National Bank Bldg., Chicago

built up a sales organization of 25 specialty salesmen. Prior to becoming affiliated with the Matthews corporation Mr. Kearney had a wide and intensive experience in the power field.

As a boy Mr. Kearney started in the electrical business as groundman, soon being promoted to second class lineman. Deciding to get some experience in plant work, he, successively, secured valuable experience as oiler, dynamo tender, assistant fireman, fireman, assistant engineer, and engineer.

James R. Kearney, Newly-Elected Director of Electrical Sales for Entire Territory of Matthews Corporation.

He then became assistant armature winder, armature winder, assistant arc lamp repairman, foreman arc lamp department, assistant and later foreman of motor department. Entering the line department, he was promoted, successively, from superintendent of line construction to engineer of construction and engineer installing plants.

At this time Mr. Kearney joined the ranks of W. N. Matthews & Bro., Inc., as salesman in the St. Louis territory. He left the company for a time to serve the Western Electric Co., covering its houses throughout the United States and Canada as specialty man on line material.

Back to W. N. Matthews & Bro., Inc., Mr. Kearney, after serving as special representative for a time, was placed in charge of sales west of the Mississippi river; then in charge of sales west of Pittsburgh; then in charge of sales for the United States.

During his spare time Mr. Kearney has invented, the following Matthews specialties: Cable clamp, slack puller, boltless cable clamp, solderless telephone connector, solderless electric light service connector, cable lug for ending heavy cables, comelong, plate anchor, universal cable rack, pole butt, open boltless guy clamp, insulator coupling, high line clamp, wall bracket, straight line heavy cable connector, and has several other patents pending.

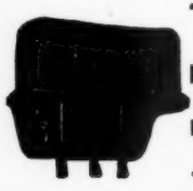
His recent appointment as director of electrical sales for the Matthews specialties is a fitting recognition of his splendid work with the power companies, jobbers and other electrical interests, as well as with the Matthews corporation. The Matthews organization is indeed to be congratulated in having on its staff a man of such outstanding ability, such wide experience, such integrity of character and such a winning personality. "To know him is to love him" is the tribute his friends pay him.

POSITION WANTED

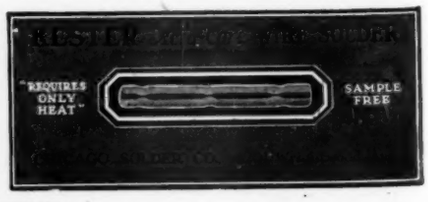
POSITION WANTED — Practical telephone man who is at present employed desires to invest $2,000 with services in some live-wire Independent company. I have had eight and one-half years' experience with the Bell Telephone Co. and nine and one-half years with Independent companies. References exchanged. Address J. E. Boatright, Crossett, Ark.

New York Engineer Invents New Call Register
A new registering apparatus to be used in connection with a telephone set has been invented by Benedetto Sapienza. The device requires no change in the wiring of the telephone set.
Calls made in absence of attendant at subscribing station are registered, so the subscriber may learn from the central station the numbers of those who called while the receiving station was unattended. Write for details. B. Sapienza, 2304 Crotona Ave., Bronx, N. Y.

GUSTAV HIRSCH
Consulting Engineer
In all branches of Telephone Engineering,
Rate Cases, Appraisals, Financial
Investigations, Inspections
and Reports.
COLUMBUS - OHIO


CHAPMAN
LIGHTNING ARRESTERS
Manufactured by
MINNESOTA ELECTRIC CO.
Minneapolis, Minn.

CEDAR POLES
NORTHERN and WESTERN
Pole Line Hardware and Construction Materials
Vitrified Clay Conduit and Tile
A. J. JOHNSON CO.
217 N. Desplaines St. Chicago, Illinois



May your business grow bigger than ever in 1925—

In turning over a new leaf turn to . . . . . .

RUNZEL-LENZ moisture proof tinsel switchboard cords. This Runzel-Lenz achievement is the cord that we worked on for years so we'd give to the telephone industry a cord that would set a steady standard for longer life, easier handling, and practically perfect transmission.

Telephone men who are particularly keen about getting the best cords on the market, took to the Runzel-Lenz moisture-proof switchboard cord right from the start.

The performance of this cord under the hardest conditions, has been watched closely by these practical cord experts. They have standardized this cord and have done so much boosting for it that its sales have climbed to one of the highest marks that any Runzel-Lenz cord has established.

Let us thank you—the earnest men who make up this telephone industry—and allow us to wish you a Prosperous 1925.

Runzel-Lenz Electric Mfg. Co.

America's foremost telephone cord specialists

1751 N. Western Avenue
CHICAGO, ILL.

Stromberg-Carlson

STAMINA

For success in any line stamina is a prerequisite.

This stamina is built into the Stromberg - Carlson No. 986 Desk Stand.

It is found in the lasting black finish, in the Duratex silk cord, in the impregnated induction coil, in the transmitter parts, in the receiver parts and in the pedestal parts.

The steel, the brass, the bakelite, the copper, the silk, the cotton, the rust-proofing, the enamel, the design, the workmanship and, in short, the finished product exemplifies the requirements for stamina not only in the selection of the raw materials, but also in the working of the raw materials.

Upon your request Bulletin No. 110, which fully describes the Stromberg-Carlson No. 986 Desk Stand will be mailed.

The Stromberg-Carlson No. 986 Desk Stand is equipped with a "Highly Efficient Transmittter."

The Stromberg-Carlson No. 986 Desk Stand is equipped with the "Booster Talking Circuit."

The Stromberg-Carlson No. 986 Desk Stand is equipped with "Bakelite Parts."

The Stromberg-Carlson No. 986 Desk Stand is equipped with "Duratex Silk Cords."

The Stromberg-Carlson No. 986 Desk Stand is furnished with desk set boxes of the "Concealed Gong" type."

Stromberg - Carlson Telephone Mfg. Co.

FACTORY and GENERAL OFFICES — ROCHESTER, N. Y., U. S. A

BRANCH OFFICES:

CHICAGO, ILLINOIS KANSAS CITY, MISSOURI TORONTO, CANADA

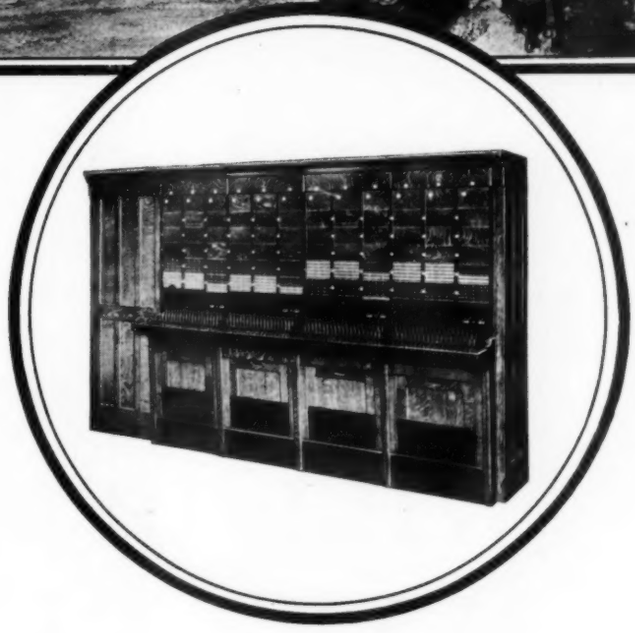
DISTRIBUTORS:

Garnett Young & Co., San Francisco, Cal., Los Angeles, Cal., Portland, Ore., Seattle, Wash. Sceville Mercantile Co., Atlanta, Ga.

JOBBERS:

Midland Electric Company, Regina, Sask. Charleston, Electrical Supply Company Charleston, West Virginia

Stromberg-Carlson



Advancement

From the creeping prairie schooner of the past century to the speeding express train of today marks a wonderful advancement in transportation.

An equal advancement in switchboard operation is marked by the difference between old-fashioned methods of ringing control, and the four-button ringing control of the Stromberg-Carlson Super-Service Switchboard.

Today, the Stromberg-Carlson Super-Service Switchboard permits the most advanced method of switchboard operation—it is equipped with seventeen features, every one of which is necessary for the rendering of telephone service with speed and with accuracy.

Upon your request, Bulletin No. 112, which fully describes the Stromberg-Carlson Super-Service will be mailed.

Seventeen Features of the Stromberg-Carlson Super-Service Switchboard:

- Operator's Cut-In
- Operator's Bar
- Advance Plugging-In
- Operator's Listening Indication
- Operator's Secret Service
- Audible Busy Test
- Operator's Ringing Control
- Machine Ringing
- Ringing Tone
- Instantaneous Ringing Cut-Off
- Reverting Call Ringing
- Dark Keyboard
- Positive Supervision
- Flash Recall
- Call Registration
- Emergency Ringing
- Calling Subscriber's Ringing Control

Stromberg-Carlson Telephone Mfg. Co.

FACTORY and GENERAL OFFICES — ROCHESTER, N. Y., U. S. A.

BRANCH OFFICES:

CHICAGO, ILLINOIS KANSAS CITY, MISSOURI TORONTO, CANADA

DISTRIBUTORS:

Garnett Young & Co., San Francisco, Cal., Los Angeles, Cal., Portland, Ore., Seattle, Wash. Scoville Mercantile Co., Atlanta, Ga.

JOBBERS:

Midland Electric Company, Regina, Sask. Charleston, Electrical Supply Company, Charleston, West Virginia

May Your 1925 Be A Prosperous Year!

COOK PRODUCTS WILL HELP TO MAKE IT A PROSPEROUS 1925

COOK ELECTRIC COMPANY
2700 Southport Ave. **CHICAGO**

Specialists in the MANUFACTURE OF PROTECTIVE DEVICES for More Than 25 Years

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Ready for Quick Installation

These two switchboards equipped as listed below are carried in stock ready for immediate shipment. If you are in need of a new switchboard before long it will be well worth your while to obtain the full information on either of these two switchboards. They are our new low type boards, durably built and will give the best of service.

MC-4942-C Switchboard

This MC-4942-C switchboard is carried in stock fully wired for 200 lines, 24 cord circuits and 2 operators' positions. It is equipped as follows:

150 Drops and Jacks

14 Double Supervisory Cord Equipments without Repeating Coils

6 Double Supervisory Cord Equipments with Repeating Coils

—3 in each position.

MC-4941-C Switchboard

This standard MC-4941-C Switchboard illustrated here has an ultimate capacity of 120 lines. They are carried in stock equipped as follows:

Lines Equipped	Cords Wired	Cords Equipped	Type of Circuit
55	15	10	3 Single Supervisory with Rpt. Coils 7 " " without " "
100	15	15	3 Double Supervision with Rpt. Coils 12 " " without " "

Our bulletin No. 56 describes in detail the complete series of Monarch Magneto Switchboards and parts. Write for your copy.

Monarch Telephone Mfg. Co.

1027 WEST VAN BUREN ST., CHICAGO, ILL.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Company Highly Commended by Commission

(Excerpts from Telephony, May 24, 1924)

The following condensed financial statement shows the company's earnings and disbursements for the year 1923:

Exchange revenues	$273,569.99
Toll line revenues	166,390.74
Miscellaneous operating revenues	3 935.38
Non-operating revenues	782.06
Total Income	$444,678.17
Total expense	289,296.55
Net earnings	$155,381.62
Dividends paid	118,133.39
Balance for depreciation reserve and surplus	$ 37,248.23

A comparison of this statement with a like statement for the preceding year shows that there was an increase of $13,-706.62 in net earnings. The dividends paid to the stockholders were $9,125.52 more than for the year 1922, thus leaving the balance for reserves and surplus $37,-248.23, or $4,580.10 more than was left for the same purpose for the year ending December 31, 1922.

The regular quarterly dividends at the rate of 8 per cent per annum on the par value of the stock were paid during the year. The dividends paid amounted to $118,133.39, making a total of $1,443,-048.86 paid in dividends since the organization of the company in March, 1899, 25 years ago.

At the close of 1923 the Union company of Owosso had in operation at its various exchanges a total of 15,636 telephones, an increase of 376 over the preceding year This total number of subscribers' telephones receiving service through the company's exchanges consisted of 11,679 telephones owned by the company and in service on its own lines, 1,443 owned by the company and in service on lines of other parties, and 2,514 telephones owned by roadway telephone companies receiving switching service through the company's exchanges.

The Union toll lines were directly connected to 4,021 telephones in exchanges owned by other companies, making a total of 19,657 telephones directly tributary to its toll line system.

Following are the officers of the Union company: President, C. T. Babcock, St. Johns; vice-presidents, J. H. Fildew, Pontiac, and C. P. Bentley, Owosso; general manager, W. J. Melchers, Owosso; secretary, L. L. Conn, Owosso; treasurer, J. B. Chapin, St. Johns.

The Union Telephone Co., on December 5, 1923, secured an order from the Michigan Public Utilities Commission fixing a new schedule of rates and charges for service in the exchanges of the company to take effect January 1, 1924. The new schedule of rates was designed and shaped to produce additional revenue at the rate of approximately $43,000 per year. The order was made following a public hearing and a thorough investigation of the affairs of the company. The investigation included an inspection of the physical property by the chief engineer and an examination of the books and records by the statistician of the commission.

W. J. Melchers, General Manager of the Union Company, Owosso, Mich., Since 1903, Is a Director of the National Association.

The written reports submitted by these experts were very favorable, and reflect credit upon the business policies and practices of the company. By far the greater part of the exchange facilities were found to be in first-class working condition and the service highly satisfactory to the subscribers. The financial records and history were found to be clean and sound in every respect. Following is an excerpt taken from the report of Edmund A. Calkins, statistician, of the commission:

"In general, the exceptionally clean financial history of this company is notable. In its inception it was organized as a small company to supply a purely local need. As time advanced the demands upon it for service caused its expansion, and an early merger with several other purely local companies. The records show that at times it had its problem of getting capital, yet withal it was able to mobilize the necessary capital without resort to those capitalization practices which so often invite criticism of, and creates doubts of the good faith of a management.

Throughout the life of this corporation there is nothing to indicate that the management has not at all times and in all its policies acted in good faith. Its aims seem to have uniformly been to protect the interests of its many stockholders without especial favors to any particular group or interests and with due regard for the demands and good will of its subscribers.

The Union Telephone Co. has been throughout its life and is today an exemplification of the original conception of a corporation; an association of individuals uniting their capital and working with a common purpose to contribute to the general welfare of a considerable body of the public."

KELLOGG SWITCHBOARD

Our Poles, Wire, Hardware, Are of the Very Best and Reasonably Priced. Let Us Ship Your Next Order.

Main Office and Factory
COLUMBUS, OHIO
111 N. Front Street

Branch Office
KANSAS CITY, MISSOURI
407 Broadway E.

Please tell the Advertiser you saw this Advertisement in TELEPHONY.

With Kellogg Switchboards—*Use—Is The Test*

GENERAL OFFICES

The Union Telephone Company.

W. J. MELCHERS
GENERAL MANAGER

CAPITAL STOCK $2,000,000.00

OWOSSO, MICHIGAN

August 14, 1924.

Kellogg Switchboard & Supply Co.,
Chicago, Ill.

Gentlemen:

Yours of August 12th. The following is a list of switchboards and the towns in which they are operating as per your letter.

Common Battery Feature Boards: Alma, Mt. Pleasant and Owosso.

Universal Switchboards: St. Johns.

Magneto Switchboards:

Ashley	Edmore	Lyons	Pewamo	Six Lakes
Bancroft	Elsie	Maple Rapids	Pompeii	Stanton
Barryton	Fowler	McBrides	Remus	St. Louis
Blanchard	Hemlock	Merrill	Riverdale	Vestaburg
Breckenridge	Ithaca	Middleton	Shepherd	Weidman
Carson City	Lakeview	Muir	Sheridan	
Durand	Linden	Ovid	Sidney	

It might be also interesting to you to note that our Connecting Companies are operating Kellogg Magneto boards in the following towns that are also located in our territory:

Butternut	Forest Hill
Crystal	Hubbardston
Chapin	Palo
DeWitt	Vickeryville
Fenwick	Westphalia

All these Magneto boards listed above are of the same type.

Yours truly,
THE UNION TELEPHONE COMPANY.
W. J. Melchers, Gen. Mgr.

WJM/MM

Every one of these are Kellogg Switchboards

SUPPLY COMPANY

CHICAGO, ILLINOIS

Warehouses:

PORTLAND, OREGON
E. Burnside St.

SAN FRANCISCO, CAL.
1054 Mission St.

Our low loss condenser, 0005, and Special R. F. Coil are in great demand.
Have You Tried Kellogg Radio Parts? Every Piece Guaranteed. Build Your Set with Kellogg for Best Results.

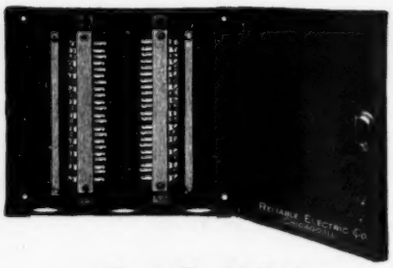
Please tell the Advertiser you saw his Advertisement in TELEPHONY.

STEEL BUILDING BOXES

For Telephone Distribution

Cable Wires Soldered

Telephone Wires Under Binding Posts



Type E—22 Pair

Type E: Equipped with treated maple strips with tinned brass connectors driven through holes in maple.

Type L: Equipped with milled hard rubber strips with brass connector bolted in place.

Reliable Electric Company

3145 Carroll Ave. Chicago, U. S. A.

AMERICAN CROSSARM & CONDUIT CO.

Main Office — CHICAGO

CROSSARMS THAT LAST

RAINIER" FIR LONG LEAF PINE CREOSOTED

FOURTEEN MILLS MAKING THEM

THIRTY-SIX WAREHOUSES DISTRIBUTING THEM

ASK YOUR DEALER FOR OUR PRODUCT

CREOSOTED WOOD CONDUIT, PINS AND BRACKETS

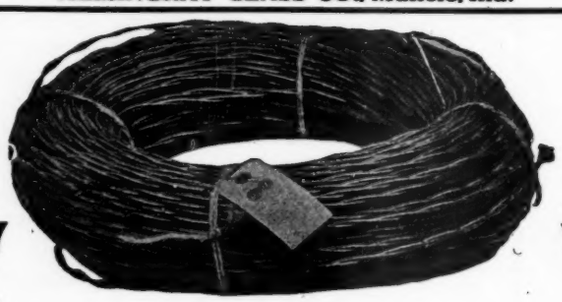
USE

HEMINGRAY

REGISTERED

Standard Glass Insulators

HEMINGRAY GLASS CO., Muncie, Ind.



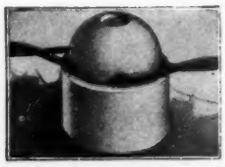
Ironite

Equal to any strain

This drop wire has attained an extensive use in the telephone field because it makes good under trying conditions.

It combines great tensile strength and toughness of insulation. It will give long, consistent service, no matter what strains are placed on it. Will not stretch, sag, or break. Write for sample.

Paragon Knobs



For insulating and attaching telephone wires, nothing equals these self-tying knobs. Neat, simple, easily installed—only one screw required. Write for circular.

Paragon Electric Co.

37 W. Van Buren St. Chicago, Ill.

206 Third Ave., S., Seattle, Wash.
1054 Mission St., San Francisco, Calif.
1612 Maple St., Los Angeles, Calif.
357 E. Burnside St., Portland, Ore.

SAVE YOUR CABLES WITH--

1. **Permits your cable to be laid underground without the use of conduit.**
2. **Eliminates corrosion and deterioration of cable sheath.**
3. **Has good cementing qualities, thus providing for adhesion to cable.**
4. **Flexible and is not affected by extremes of hot or cold weather.**
5. **Can be used for patching and mending defective cable sheath.**

EVER-PROTECT

Write for important data—today.
Order from your jobber or direct.

NATIONAL CABLE COMPOUND CO.

Incorporated

MITCHELL - - - - - - - - INDIANA

OPPORTUNITIES!

Rates 8 cents per word, payable in advance. Minimum charge $1.50. Send cash with order.

"REBUILT" TELEPHONE APPARATUS

and exchange equipment saves you 30 to 50 per cent—quality and efficiency guaranteed.

EVERYTHING YOU NEED

for the installation and operation of a complete exchange—Magneto or Central Energy.

EIGHTEEN YEARS' SUCCESSFUL OPERATION

of our "Rebuilt" Equipment Department puts it past the experimental stage. **Ask for Our Free No. 78 Bargain Bulletin.**

ADDRESS

"Rebuilt" Equipment Department

Premier Electric Company

Chicago, Ill.

"REBUILT" when connected with PREMIER means something.

RECONSTRUCTED EQUIPMENT

Western Elec. Co., No. 22 3-bar Bdg. hand Gen. Complete with cranks @	$1.50
Western Elec. Co., Transmitter Arms re-enameled @	.35
Western Elec. Co., 2500 ohm self-contained ringers with gongs @	1.50
Kellogg Local or C. B. Transmitters, complete with back and mouthpiece @	1.15
Monarch or Dean Local or C. B. Transmitters, complete with back and mouthpieces @	.85
Western Elec. Co., 3-bar, 1000 or 2500 ohm Bdg. hotel sets equipped with Kellogg, Dean, Stromberg, or Monarch Transmitters and Rec. @	6.50
Monarch 4-bar, 1000 or 1600 ohm Bdg. compacts @ $7.50—5-bar @	9.00
Garford or Dean Pony type 4-bar, 1000 ohm Bdg. compacts @ $8.50, 5-bar @	9.00
Am. Elec. 3-bar 1000 ohm Bdg. Compacts @ $6.50—4-bar 1000 or 1600 ohm @ $7.00—5-bar @	7.75
Stromberg No. 104 type 4-bar 1000 or 1600 ohm Bdg. compacts @	7.50
Monarch 3-bar 1000 ohm Bdg. desk sets @ $8.50—4-bar 1000 or 1600 ohm @ $8.75—5-bar @	9.00
Garford 16-33-50 or 66 Cycle Harmonic ringers with gongs @	1.25
Western Elec. No. 143 W Receiver shells and caps, NEW @ 37c, lots 100 @	.35
Western Elec. Mouthpieces, NEW @ 7c, lots of 100 @	6¼c
Western Elec. Co., 3-bar 1000 or 2500 ohm desk set signal sets @	4.50
Dean or Kellogg Standard Size 1-M. F. Condensers @	.35
Kellogg No. 10½ M. F. Cond. @	.35

REBUILT ELECTRIC EQUIPMENT COMPANY, Not Inc
E. C. Stoeffhaas, Mgr.
1940 W. 21st Street, CHICAGO, ILL.
We are not connected with or successors to Rebuilt Telephone Equip. Co.

HELP WANTED

WANTED—Good line and switchboard repairman for magneto exchange near Lexington, Kentucky. State age, experience, and salary. Address D. B. White, Box 884, Atlanta, Ga.

WANTED—Young man for position as secretary or chief clerk for manager of a telephone company, with stenographic experience. Submit references with reply. Address P-6117, care of TELEPHONY.

GUARANTEED REBUILT TELEPHONE EQUIPMENT

November Bulletin

Kellogg (small compact type) 3 or 4 bar gen., 1000 or 1600 ohm ringers	$9.50
Kellogg (2700 type) comp. 3, 4 or 5 bar gen., 1000 or 1600 ohm ringers	$8.50 & 9.00
S. C. compacts, 3 or 4 bar gen., 1000 or 1600 ohm ringers	$8.00 & 8.50
Dean compacts, 3 or 4 bar gen., 1000 or 1600 ohm ringers	8.00
Century compacts (good condition), 3, 4 or 5 bar gen., 1000 or 1600 ohm ringers, (equipped with W. E., Kellogg, S. C. or Century trans.)	6.50
Kellogg desk sets (compact type), 3 bar gen., 1000 or 1600 ohm ringer	8.50
4 bar gen., 1000 or 1600 ohm ringer	9.00
S. C. Desk stands (ball swivel type), with good misc. signal sets, 3 or 4 bar gen., 1000 or 1600 ringers	7.00
Kellogg No. 39 desk sets, with No. 75 steel signal boxes	7.50
S. C. Ball type desk sets, with wood or steel signal boxes, straight line or harmonic ringers	6.75
Dean late type desk sets, with steel or wood signal boxes, straight line or harmonic ringers	6.00
Kellogg steel hotel sets, straight line or harmonic ringers	7.00
S. C. Steel hotel sets, straight line or harmonic ringers	6.25
W. E. wood hotel sets	7.00
W. E., Kellogg or S. C. receivers	1.00
W. E., Kellogg or S. C. transmitters	1.00
Misc. good transmitters	.70
Misc. good receivers	.75
Receiver cords	.15
Desk set cords, three cond	.35
Misc. ringers	.70
W. E. ball type drops, 5 per strip	9.00
W. E., Kellogg, S. C. or Dean harmonic ringers	1.00
Kellogg drops, 5 per strip	8.00
Mouthpieces (W. E. Kellogg, Dean and S. C.)	.08
W. E. ball type, single mounting	2.00
Universal Receiver shells and caps (new)	.40

All kinds of telephone equipment repaired; rates reasonable.

We carry a large stock of rebuilt telephone parts. Write us regarding your requirements.

ELECTRICAL INSTRUMENT REPAIR CO.
1043 West Madison St., Chicago, Ill.

Cook Electric Company's Terminals

S-18-D, S-19, S-M-1, T-5, T-19, T-22, T-29, T-29-D, M-4, M-8, M-10-1 and M-13.

Let us save you 25 to 40 per cent on the above guaranteed equipment.

BUCKEYE TELEPHONE & SUPPLY CO.
30 W. Spruce St. COLUMBUS, OHIO

WANTED

Scrap Platinum. We pay highest prices for platinum contact relays, ring keys, etc.

Contact Metals Co.
221 E. 23rd Street Chicago, Illinois

Get your Telephone Repair Work done at the old reliable Telephone Repair Shop. SUTTLE EQUIPMENT CO., Lawrenceville, Illinois.

FOR SALE

FOR SALE—If you want to purchase or sell a telephone property, write H. B. Crandell, P. O. Box 226, Springfield, Ill.

FOR SALE—Two position Western Electric 1200 type toll board equipped with 40 lines, 10 trunks, 20 heavy toll user multiples, 10 prs. cords to each position. Arranged to operate in conjunction with common battery board. In first class condition and now in service. Will be released about January 1st, 1925. Can be seen in operation at company's office, 220 E. Washington St., Macomb, Ill. Reason for selling: have just installed a common battery board. Address Macomb Telo. Co., 220 E. Washington St., Macomb, Ill.

FOR SALE—1200-line Magneto Multiple Switchboard in fine condition. Must be seen to be appreciated. 2,000 Magneto telephones, 1,600 ohm biased ringers and three bar generators. Now in use on two-party selective ringing lines. Can't be beat for that class of service. Also about 400 Monarch Desk Telephones, some 1600 ohm biased and balance 300 ohm series. Also a small carload of double groove Pony Glass. Let us have your wants; if we have it, it's for sale. We are cutting over to new exchange about March 15th. Address Creston Mutual Telephone Co., Creston, Iowa.

FOR SALE—Series telephones, $3 and $4; bridging $5. "You shipped us six series telephones and they were very satisfactory," this from Tryon, N. C. Address Nappanee Telephone Co., Nappanee, Ind.

WANTED TO BUY

WILL BUY—Exchange 500 to 1,000 telephones. South Dakota preferred. Confidential. Write 6116, care of TELEPHONY.

POSITIONS WANTED

WANTED—Telephone man experienced in all branches of the business wishes position with good company. Either common battery or magneto. Address 6115, care of TELEPHONY.

BUYERS' REFERENCE

Addressing Machines
A1.

Ammeters
W1.

Anchors, Guy
C12, E4, H7.

Anchors, Twist
H7.

Anchors, Screw
R6.

Apparatus, Fire Fighting
J1.

Appraisers
A2, H3, H4, P5, W2.

Arms and Brackets (for holding telephones)
A4.

Arresters, Lightning (See Protective Devices)

Asbestos, Panel Boards
J1.

Asbestos Switchboards
J1.

Asbestos Wood, Ebony
J1.

Attorneys
B8.

Auditing, Accounting and Systems
B11, C7.

Augers
I4.

Automatic Telephones
A9, K1, N7.

Batteries, Dry
C3, F6, N1.

Bells, Magneto
A4, H5.

Belts and Safety Straps (Linemen's)
K2.

Binders (For Poles)
S3.

Binders (Directory)
A10.

Blank Books (etc.)
F3.

Blow Torches
P8, T4.

Blue Printing Machinery
P7.

Bolts and Nuts
L2.

Bolts (Expansion and Toggle)
C14, H7, L2, N5, S5.

Bond Wires
C9.

Books
M8.

Bores, Battery
P2.

Bridle Rings
H7.

Brushes, Motor and Lighting
N1.

Cable
A5, A7, A8, B4, H1, I1, R3, S7.

Cable, Bare
A4, B4.

Cable, Weatherproof
A4, B4.

Cable Compound
N10.

Cable Reel Carriers
H7, L2.

Cable Rings
C2, N5.

Cable Splicing Joints
J1.

Cable Terminals
A4, C8, R2, S7.

Cabinets
L5.

Carbon
F6, N1.

Cards, Book Forms
W4.

Clamps, Ground (Plates, Cones)
B12, C2, P2.

Clamps, Guy
C8, E4, L2, N5, R3.

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B6, K2, S2.

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C2, H7, L2.

Clips, Testing
F5, S8.

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C1.

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A4, A5, M5, S8.

Coils, Rewound
E2, P6, R1.

Coils, Resistance
A5, B4.

Coil Winding Machines
B6.

Condensers
A4, A9, F1, L3, M5, S9, W3.

Commutator Resurfacer
I6.

Conduit, Fibre
J1.

Conduit Rods
C9, J1, M3.

Conduit (Creosoted)
A3, P9.

Conduit, Underground
A3, C6, J1.

Connectors, Wire Test
C8, F5, H5, R2, S8.

Construction Specialties
C8, C9, H7, J1, K1, M3, L3, M5, R2, S2, W3, P8.

Copper Cables and Strands
B4, H1, R3, S7.

Cords, Lamp
A4, B4.

Cords, Portable
A4, B4.

Cords, Telephone & Switchboard
A9, B4, G1, H1, R5, S9.

Counters
V3.

Cross Arms
A3, P9.

Diggers
I4.

Drafting Room Supplies
P7.

Duct, Underfloor
J1.

Electrical Instruments
E2, H5, S8, W1.

Engineers, Telephone
A2, B1, C10, F4, H3, H4, M4, P5, S4.

Fireproof Bldg. Lumber
J1.

Fire Fighting Apparatus
J1.

Flux, Soldering
B4, B9, B12, C5.

Fuses, Mica
A4, C8, R2.

Generators, Ringing
H5, L3.

Grounding Devices
C11, P2, R2.

Guy Stretcher
H12.

Hangers, Cable
C2, C8, E4, H7, L2, N5, R2, S7.

Improved Party Line Systems
A9, L3, M5.

Insulate
B4, G2, R5, S7.

Insulators
G2, H2, J1, L1, L5, P2, T3, U1.

Insulated Copper Wire
B4, H1, S7.

Insulated Staples
B5.

Insulating Compounds
G2, J1, N10, S7, B4.

Insurance, Fire and Employers' Liability
B10.

Intercommunicating Systems
K1, M5, S9.

Jacks, Pole
H13, T2.

Linemen's Supplies
C9, H7, K1, K2, S2, W3, P8.

Lumber, Fireproof Building
J1

Magneto Charger
N12.

Meters (Electrical Testing and Measuring)
W1.

Office Supplies
F3.

Ohmmeters
W1.

Parts, Special Telephone
A4, A9, F1, K1, L3, M5, S9, W3

Pins and Brackets
A3, H7, I2.

Platinum
B3.

Pliers
K2, S2

Pliers, Insulated
S2.

Pole Pullers
H13, T2.

Pole Pushers
H13.

Pole Straighteners
H13, T2.

Pole Steps
A7, H7, I2, L3.

Pole Line Hardware
C2, H7, J1, K1, L2, M5, N5, W3, S2, W3.

Poles, Treated or Plain
B5, C4, C13, I3, N4, N8, P1, P3, P4, S1, S11, W8, N6.

Preservatives, Wood
A3, I3, I4, P1.

Printing
F3, D1.

Protective Devices
A4, B12, C8, J1, M3, N3, P2, R3.

Pruning Tools
B3.

Radio Supplies
A4, B4, I2, K1, M5.

Rebuilt Telephone Apparatus
B15, E2, P6, R1.

Ringing Equipment
H5, K1, L3, W3.

Rubber Goods
E6.

Semi-Automatic Systems
N7.

Service Telephone
A6.

Shelving, Metal
L5.

Sleeves, Paper
C8, R2, R3, S7, B4.

Sleevings—Cotton
B4.

Solders, Sticks, Liquids, etc.
B4, B9, C5.

Solder, Self-Fluxing
B4, C5.

Soldering Irons and Tools
P8.

Soldering Flux, Paste, Salts
B4, C5.

Splicing Clamps, Pliers, etc.
S2.

Stills, Storage Battery Water
W5.

Strand and Cord
B4, C11, H1, R3, R8.

Switchboard Cable
K1, R5, S7, S9, B4.

Switchboards, Telephone
A9, F1, K1, L3, M5, N7, S9, W3.

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P3.

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E6, J1.

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A9, F1, K1, L3, M5, N7, N9, S9, W3, W6.

Telephone Supplies (Jobbers)
I2, K1, M5, N5, N9, W3

Testing Sets
H5, K1, M5, S8.

Tie Wires
C11.

Timing Devices
C1, V3.

Tips and Terminals
B4.

Tools
I4, K2, S2.

Tool Bags and Boxes
K2.

Torches, Blow
T4, P8, U2.

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A9, F1, K1, L3, M5, N7, S9, W3.

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B3.

Trouble Finders
S8.

Underground Specialties
C9, J1, N10.

Vacuum Cleaners, Electric
E5.

Voltmeters
E2, W1.

Water Still, Automatic
W5.

Wire, Aeroplane
A4, R3.

Wire, Copper, Bare
A4, B4.

Wire, Copper
A4, A5, A7, A8, B4, C11, I1, R3, S7.

Wire, Copper Clad Steel
B4, C11, S7.

Wire, Enameled and Magnet
A7, B4, H1, R3.

Wire, Galvanized Iron
A5, A7, I1, P2, R3.

Wire Rope Slings
A7, R3.

Wire, Rubber Covered
A7, B4, H1, P2, R5, S7.

Wire, Telephone and Radio
B4.

Wire, Telephone and Telegraph
A7, C11, I1, P3, R3, S7.

Wire, Twisted Pair
C11, P2, B4.

Wire, Weatherproof
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BONITA RINGS

Endorsed and used extensively by the leading *WIRE* companies

CAMERON APPLIANCE CO.
EVERETT, MASS.

North

The North Line offers every kind of automatic telephone service, including the Automanual System for local and toll service, Automanual Remote Control of small exchanges and Dial Automatic for both private exchanges and central office equipment.

The North Electric Manufacturing Company
Galion, Ohio
Manufacturers of Telephone Equipment Since 1884

Note Protection at Corners

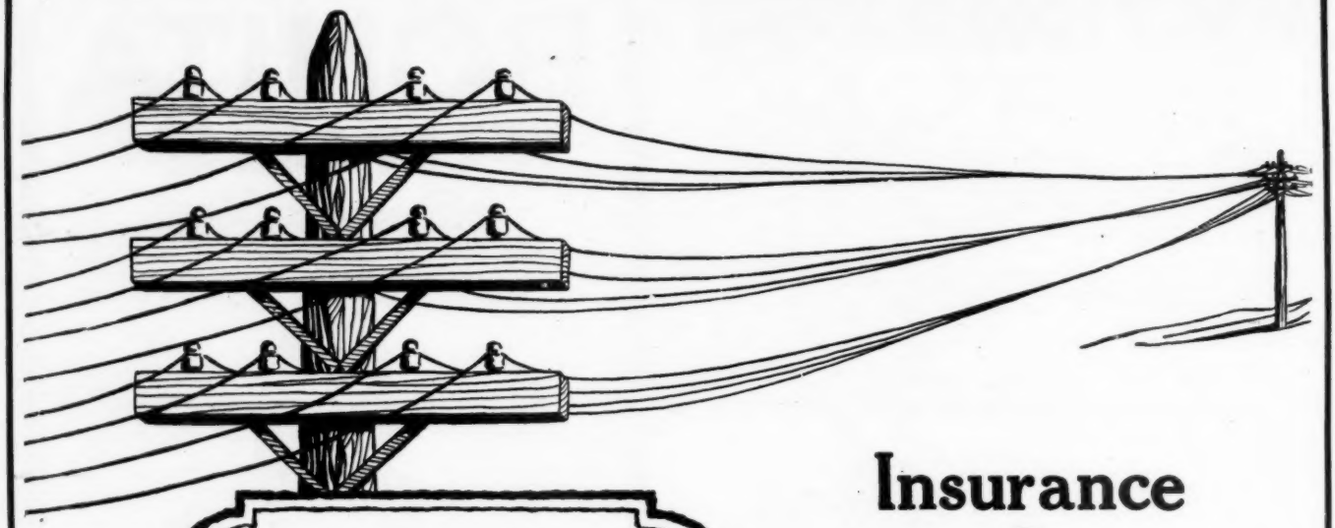
Blake Insulated Staples

Unequalled for telephone and bell wiring. The fibre insulation prevents troublesome short circuits and grounds.

4 Sizes Pat. Nov., 1900

Write for Samples

Blake Signal & Mfg. Co.
BOSTON, MASS.



Insurance at Cost

The Policy

Of Lynton T. Block & Co. is to issue the most satisfactory and comprehensive insurance to be had anywhere—

Furnishing absolute protection at cost

Embodying all the standard features and more

Covering special classes and selected risks

Selling at established rates

Returning savings at the end of the policy period, depending upon the individual experience of the risk

Giving a claims service that is not equalled elsewhere

It is an honest policy, carried out in an honest way and gives a square deal under all conditions.

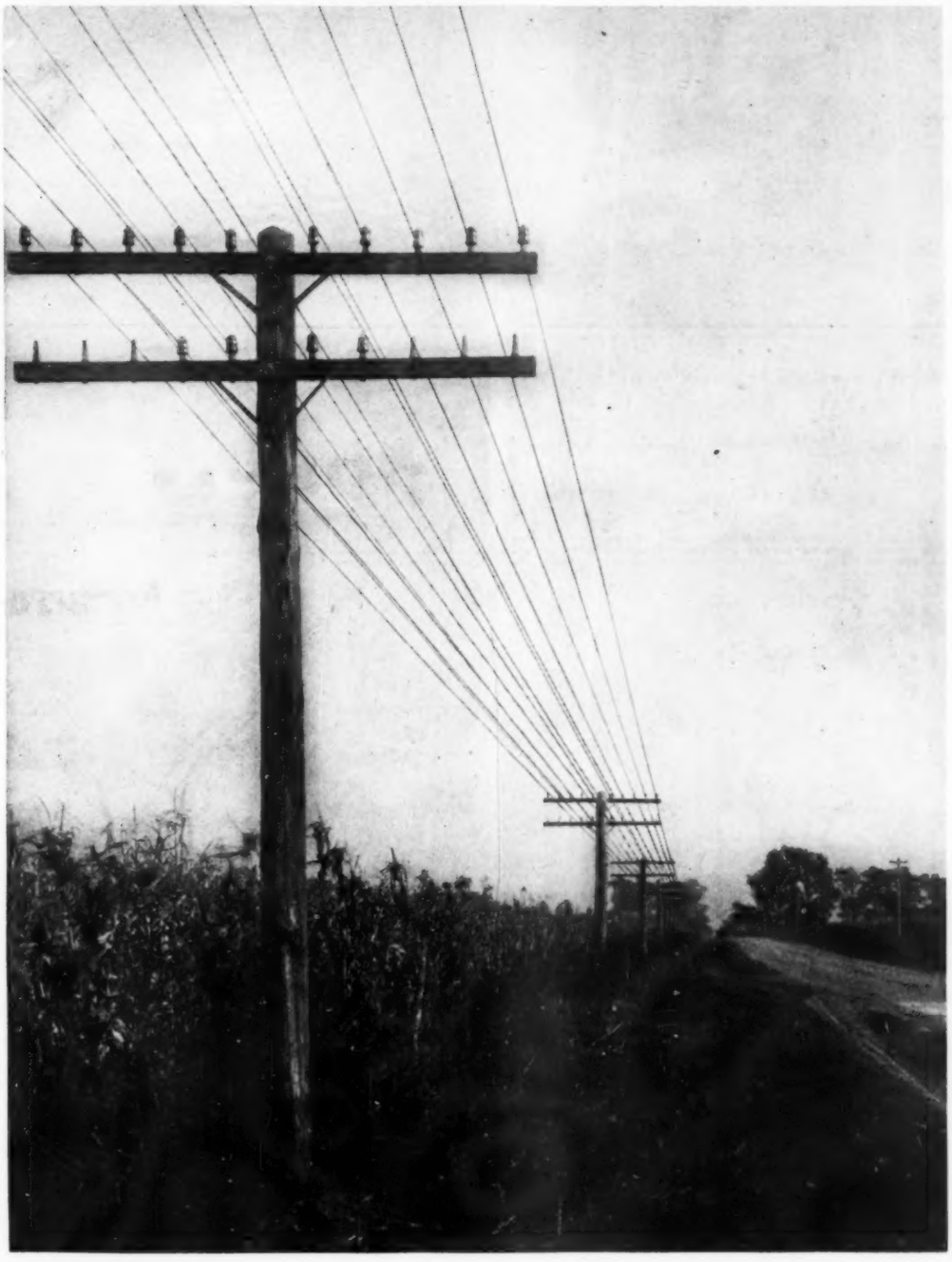
This forms the creed of every member of the organization and has built up the reputation of Lynton T. Block & Co. until it is one of the best and most favorably known in the Mississippi Valley.

LYNTON T. BLOCK & CO. PROTECTION AND SERVICE

WORKMEN'S COMPENSATION
EMPLOYER'S LIABILITY
PUBLIC LIABILITY
TEAMS LIABILITY
CONTRACTORS' LIABILITY
ELEVATOR
AUTOMOBILE

LYNTON T. BLOCK & CO.
UNDERWRITERS, INC.
Underwriters of Selected Class Insurance at Cost
Utilities Indemnity Exchange
Employers Indemnity Corporation
Chamber of Commerce Bldg.
ST. LOUIS, MO.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.



TO support your lines is still a pole's chief job. If it had every other good quality, but did not have the strength and durability to support a load, it would be of no value as a telephone pole. You need not sacrifice any of these vital points. NAUGLE POLES have *all* of them. Users will tell you this. Your order can be loaded within 24 hours at one of our big yards nearest you. Butt-treating is done right in the yard from where your order is shipped—no appreciable delay. Super-Service! Our prices have been considerably reduced. Let us quote them. *Naugle Pole & Tie Co., 59 East Madison St., Chicago.*

NORTHERN & WESTERN CEDAR

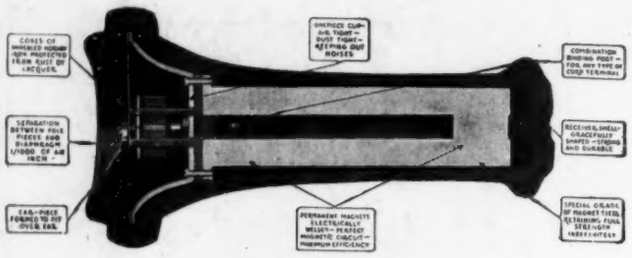
Butt-treated or plain

BRANCHES: New York, Columbus, Kansas City, Spokane, Vancouver, Boston

*MAIN YARDS: *Chicago, *Pinconning, Mich., Green Bay, Wis., Vancouver, B. C., *Sand Point, Idaho, *Spokane, Wash.*

**Butt-treating plants and Pentrex machines at these yards.*

NAUGLE POLES



ELECTRICALLY WELDED MAGNETS
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